Work for Prosperity . . . and You'll Win

TO the man with his ear to the ground, there come the increased rumblings and groanings of the immense volume of compressed and repressed business seeking outlet into the avenues of current consumption.

Beneath the surface, invisible to the eye of the reader of current statistics, but nevertheless omnipresent, the accumulation of repressed business is welling up and up until, at no far distant date, it will find a crater opening and gush forth into every division of industry.

We have come into the era of repression, an artificial suppression of all those industrial forces, which make for expansion of trade and consequent enlarged re-employment of men, materials and money. The outstanding repressive barrier of business recovery has been the lack of confidence in the integrity of the administration's plans and purposes.

Every sign on the horizon indicates that radicalism, wherever it has made a bid for political preferment, will receive a merited rebuke in the coming election.

Already, the President and his advisors are making friendly gestures and extending helping hands to our bankers and business men alike.

No former administration in Washington was ever so well informed of the facts of commerce and industry and the trend of public opinion throughout the country. There is not a scintilla of doubt today, but that the President knows that the restoration of business is wrapped up in the resumption of the flow of private investment and capital into new and expanding enterprises. Restoration of capital industries, and re-employment of some four millions of men therein, hinges upon the return of safe investment in such industries and operations of them totally and permanently free of the menace of racketeer-labor privateers.

In this connection, it is noteworthy also that the President is reported as being thoroughly disappointed in the conduct of the American Federation of Labor activities and is making no bones of his belief that "its leaders have let him down." Therein lies the potent force making for early restoration of confidence and an equally early release of pent-up capital to be invested in American trade and industry.

All factors contributing to depression are known and solved and the barriers erected by repression are yielding rapidly. We are on the way up. It is this fact that every man needs to seize and operate upon. Faith in yourself, faith in your business, and faith in your country is the basis of substantial advancement and success. Invest in it. Behold A Century of Progress at Chicago just closed. No finer example exists of what an investment backed by faith can do. Those Chicago men, who in the year 1932, when business touched bottom, invested their money in the World's Fair just closed, have received their entire investment repaid, with six per cent interest. An unparalleled successful financial achievement. They had faith in themselves and their country despite the depression. The only World's Fair that ever paid.

Here is another 475 million dollar faith investment which ought to stimulate timid investors: Henry Ford states that he will make and sell one million automobiles in 1935.

And still we have to chronicle another: Announcement has just been made that through the H. O. L. C., the country is embarking on the biggest building campaign in its history. Requiring an investment of

two billion dollars, financed by real estate bonds, backed by the Government. This is a sound recovery program without precedent, providing employment for millions of men, in an industry which has been woefully stagnant for five years. At the same time, it provides guaranteed five per cent bonds for sure investment for the millions of savers looking for safe interest bearing securities.

Lastly behold the lusty baby of the railroad age—the stream line train. Already a success, forcing a demand which brooks no delay, requiring investment estimated from six to twenty-six billion dollars, all of which America will furnish.

How can any red blooded American, with faith even less than a grain of mustard seed in his system, allow his faith in his God and his country to paralyze his energies?

Prosperity is returning.

Work enthusiastically for it and you'll win.

A Question of Service

THE analysis of the discharge effluent from a machine with a number of years of satisfactory performance to its record showed its efficiency to be seriously impaired. Losses were much too high. Profits that should have been expected from the operation of the equipment were going to the sewer.

It was immediately decided, as may be readily assumed, that the machine was at fault. Rather than checking the cause, however, an S. O. S. was sent to the equipment manufacturer. A service engineer was wanted and was wanted quickly.

Nothing was said about traveling expense or payment for services. It was simply a question of service expected from a purchase made years before. At any rate, it was in that spirit and with the thought of maintaining good-will that the equipment manufacturer responded to the S. O. S.

An engineer was immediately dispatched to the mill for the sole purpose of ascertaining the difficulty and correcting the situation if possible. The company prided itself on its service to customers and here was an opportunity to demonstrate.

When the engineer arrived at the mill and looked over the installation, the trouble was located almost immediately. The leak was so obvious that it was difficult to understand why it hadn't been observed before.

Of course, it might be argued that the engineer was more familiar with the design of the machine than any production executive at the mill and that he knew where to look for trouble. Such, however, was not the case as only a cursory visual inspection was required to locate it.

Perhaps no such experience ever occurred in your mill, but doesn't it seem that in this case it would have been to the advantage of the mill and of its operating personnel to have sought the difficulty rather than calling upon the equipment manufacturer for help. Most certainly had the operating or maintenance staff looked for it, they would have found it. In so doing they would have relieved the machinery manufacturer of unnecessary expense and would have given themselves a better understanding of their work which could hardly be other than beneficial.

It is believed that all progressive manufacturers of equipment for pulp and paper mills are more than willing to co-operate with customers whenever problems arise in the use of their equipment, but surely no manufacturer should be called upon for service of a character that should ordinarily be performed by the mill personnel.

Share Your Thanksgiving

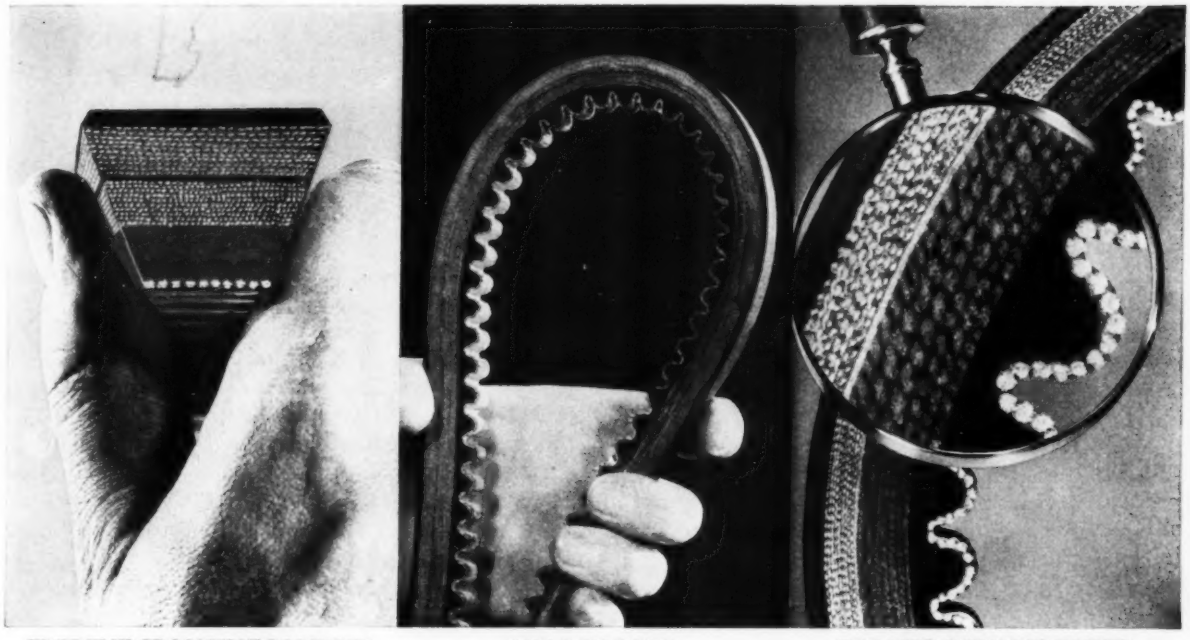
THE last Thursday of November is a legal holiday. For a number of years it has been customary for the President of these United States to set apart this day from all other days of the year as Thanksgiving Day. The custom is now so firmly established that by many it is looked upon as the November holiday without further thought as to its real significance.

How different is this attitude from that of the small band of Pilgrims who had withstood the hardships of their first New England winter and had harvested their first crop from land they had wrested from the wilderness. It was with reverence that they set apart a day for thanksgiving. They were truly thankful for the harvest and that their lives had been spared. Not only did they thank God publicly for his mercies, but they also shared of their blessings with the friendly Indians of the neighborhood.

How much more have all of us for which to be thankful? A recapitulation of some of our many blessings could easily be made but suffice it to say that we are associated with one of the most fundamental of industries—an industry through which much of our present civilization has been made possible. It is an industry of which we can all be proud and with Thomas Churchyard can say,

"I prayse the man that first did paper make,
The only thing that sets all virtues forth;
It shoes new bookes, and keeps old workes awake,
Much more of price than all the world is worth."

Let us not forget the place that paper fills in the daily needs of the world and be thankful not only for our association with the industry which produces it but also for the many other treasures that will glitter anew if we share our thanksgiving with others.



EXTREME CROSSWISE RIGIDITY
No other V-Belt combines such positive crosswise rigidity with such extreme flexibility.

BUILT TO BEND
See how the "cogs" take up the compression on the inner surface of the belt.

GREATER GRIPPING POWER
Sides die-cut—not molded—with raw edge contact surface, give greater gripping power with less tension.

COMPARE

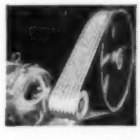
THE DAYTON COG-BELT WITH ANY OTHER V-BELT IN VITAL PRINCIPLES OF CONSTRUCTION

Considering how it is made and what it does, the Dayton Cog-Belt is without a rival in the V-Belt field. Back of it are advanced principles of design and construction which result in superior performance, longer life, and lower operating and maintenance cost.

First, it is the only V-Belt specifically *"built to bend."* Its patented cog and laminated construction provide far greater flexibility . . . enable it to flex easily around even the smallest pulley without buckling or rippling.

And while it is more flexible, its laminated construction and patented reinforcement give it *extreme crosswise rigidity*. There's no squashing in the pulley groove . . . no distortion nor twisting. No other V-Belt combines such extreme flexibility with such positive crosswise rigidity.

Added to these important qualities are its *die-cut sides*. The raw edges of these die-cut sides form the driving surface of the belt . . . one of the reasons for Dayton Cog-Belt's powerful leech-like grip in the pulley groove. There's less slipping and sliding, even with quick starts and stops . . . less loss of power . . . less vibration . . . less tension . . . less wear on bearings.



Even a hurried comparison will reveal these advantages of the Dayton Cog-Belt. But there are many more reasons why it is setting new standards of performance in hundreds of industrial plants. Let us show you how it can save money for you in many ways; and especially why Dayton Cog-Belt Drives are the most efficient drives in the world today. Write us.

THE DAYTON RUBBER MFG. CO.
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Factory Distributors in principal cities and all Westinghouse Electric and Manufacturing Co. Sales Offices

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COG-BELT DRIVES

Also manufacturers of Dayton Fan Belts . . . Dayton Red Tube Radiator Hose . . . and the famous Dayton Thorobred Tires and Tubes

WORDS . . . .

By WILLIAM SIBLEY

SOME years ago one of America's most imminent phrenologists said to me, "Sibley, your vocabulary is deplorable. If you are going to be a writer or an advertising man you must enlarge your vocabulary." Whereupon he reached across his desk and picked up a well-thumbed dictionary. Opening it at random, he continued, "Let me explain what I mean. Here, for instance, is the little word *design*. Now tell me—what does *design* mean?

"Well," I replied, "as a noun, the word design means a pattern, or the arrangement of elements; as a verb, it means to outline, plot, or plan."

"That's right," he said. "What else does the word design mean?"

"I don't know," I admitted. "Are there any other meanings for the word 'design' than those I mentioned?"

"Indeed there are," he enthused. "And that is exactly what I mean. Being asked if you knew what the word 'design' meant, you would have confidently answered 'yes'—but as a matter of fact you don't. That is, you know only 2/9ths of that word, because right here are listed nine definitions of the word design—and you have given me only two of them.

"It is the ability to use words—ordinary, every-day words—in their exact but varying shades of meanings that indicates the extent of one's vocabulary. It is not the mouthing of large, uncomfortable, and little-understood words that makes a good, or 'large' vocabulary. It is the ability to use words everyone understands, yet with such a regard for their distinctive meaning and fineness of their application that your hearer instantly and exactly understands your expression."

This little sermon started me on the most interesting game I have ever learned—the study of words. Words differentiate man from beast. They are our shovels for the expression of thoughts, and depending upon how those shovels are used, may clear away the overlay of misunderstanding or heapingly pile up the mounds of confusion.

Words are moving, living forces, capable of serving both ends—good or ill. They can be as destructive as dynamite, as beneficent as brotherhood. There is nothing in the world so powerful as words. Words have caused wars, lost wars, won peace. It may well be said that three little words (*scrap of paper*—spoken in reference to a treaty) cost Germany the World War. He who commands words, commands events, commands men, commands money, commands influence. History has yet to reveal a master of words who was a failure.

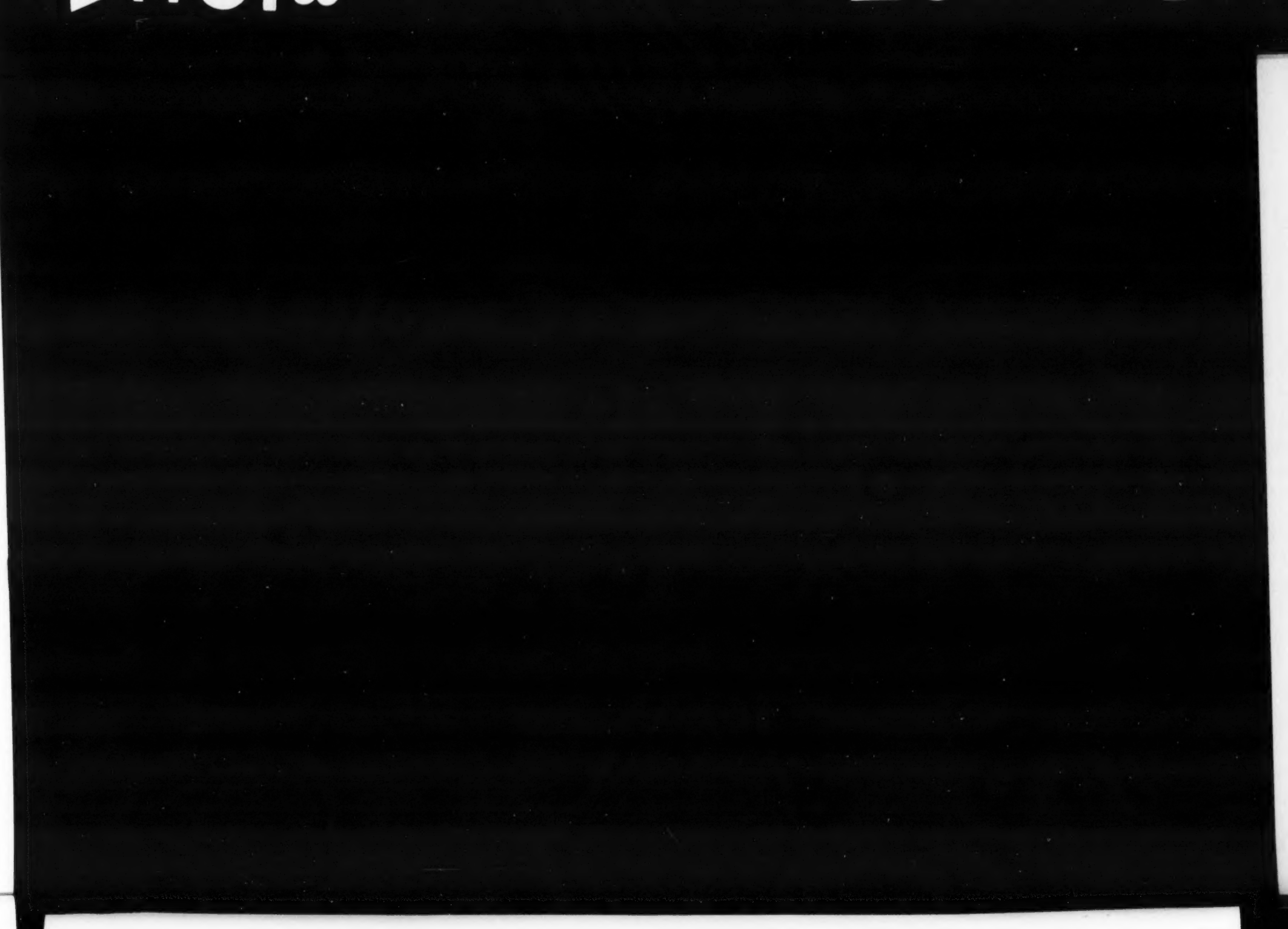
To become a linguist requires persistent industry and common sense. Yet I earnestly recommend the study of words. They are the clothes with which we dress our thoughts, and while there may be an excuse for thread-bare clothing, there is no excuse for a shabby vocabulary. Lack of words is a hole in your mind. Groping for words is like trying to conceal the frayed ends of a coat sleeve without your neighbor noticing your actions. The English language contains more than 500,000 words; a small vest-pocket dictionary as many as 25,000. The constant use of worn-out words is like dressing yourself in rags. The use of slang is comparable to the wearing of loud stripes and gaudy colors. To use profanity or vulgarity is like wearing an egg-smeared tie.

Study words, that you may use them distinctively and effectively. They will become for you rungs on the ladder of achievement. Learn the fine shades of meanings each word possesses. You will find their distinction of shades as beautiful as pastels. You will find satisfaction in seeing how the use of those fine distinctions instantly dispels misunderstanding.

The study of words will show you that because something may be *irritating* it does not necessarily follow that it is also *exasperating, annoying, provoking, nettling, angering, stinging, enraging, exciting, chafing, galling, or vexing.* Yet the study of words will reveal the fact that you doubtless are using *irritate, annoy* or *provoke* in places where some other word would fit with far greater distinction—thereby proving that you are dressing your thoughts in rags.

Try to replace the soft, round, full tonal qualities of the *o* in "love" with the hard, harsh, sharp *a* in "hate." "Lave" could be anything but "love." Try upsetting the consonant in the biggest, broadest, tallest, strongest word in any language "We" and you will find yourself with the meanest, the smallest of all words—"Me."

The study of words will show you that it is the quality, not the quantity, that counts. The final result of your study of words will reveal to you that until you can master your thought-expression, you cannot master a situation. The study of words will teach you the extreme value of tolerance, praise, appreciation, sympathy, encouragement, restraint, cheer, comfort, inspiration and aid.



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THE PAPER INDUSTRY
A MONTHLY EDUCATIONAL JOURNAL

Shall Industrials and Utilities Interchange Electric Power?

By CHESTER REED EARLE

SUPPOSE THAT the paper mill of which you are an executive or an engineer were offered today the opportunity to interchange power with the local public utility. Such an interchange would mean that if you had any surplus electric power it could be fed into the utility's transmission system, for a price per kilowatt-hour that would depend on whether it were "dump" or "firm" power; also, you would draw power from that system in the event of an unavoidable shut-down of your own generating equipment. What would your reaction be to such a proposal?

Since you can generate power for less than half of what it costs the utility and since your distribution costs are far lower, you may be inclined to ask why you should be interested at all in any such proposal. Why should any industry be interested? What is the present situation in the country with regard to interchange of power and steam? What are the future possibilities, technical and economic?

Because this subject is being discussed more and more vigorously every day by power engineers and because it should be of vital interest to the paper industry, this article will attempt to review briefly the existing situation, will indicate sources of detailed information to answer the questions you may have asked and finally will note some of the possibilities for the future that are being discussed by industrial and utility power engineers.

If we may judge by the spirited discussion of the subject carried on at the December, 1933 annual meeting of the American Society of Mechanical Engineers, the issue will doubtless generate a considerable amount of heat, accompanied also, it is hoped, by a considerable amount of light. It may be that the power interchange controversy will replace the subject of stokers versus powdered coal as a stock argument for the power engineering profession. In the latter case, it became necessary for the disputants to learn something about both sides of the question with good results all around. If the same thing occurs with the subject of power interchange, similar benefits will accrue.

Possibly the best review of the existing conditions of power interchange was given at the above-mentioned A. S. M. E. meeting in a paper entitled "Interchanging Steam and Electric Power," by H. Drake Harkins of E. I. duPont de Nemours & Co. Another paper on "Steam and Power Supply," by Vern E. Alden, of Stone & Webster Engineering Corporation, discussed important phases of the problem. Both of these, with some of the discussion of them, were published in *Mechanical Engineering*.

It is significant that the most detailed engineering analyses of this subject to be made public have been carried out by industrial plant engineers or from the industrial point of view. With a few notable exceptions, public utility engineers have not made their analyses so freely available. Paper mill engineers are familiar, of course, with the work done on this subject by Guy B. Randall, of Champion Coated Paper Co., especially his notable paper on "Pooling of Power" in the June 1, 1932 issue of *Power Plant Engineering*. Another engineer intimately connected with the paper industry, V. D. Simons, has made some valuable studies of joint firm power plants, of which the plant of the Munising Paper Co. is the outstanding example.

The Existing Situation

Reverting to Harkins' paper, we find some conclusions and data that will surprise many industrialists, although they should not surprise paper mill men. Mr. Harkins points out that utilities have about 30,000,000 kw. of capacity installed and industries about 8,500,000 kw., or 28 per cent of utility capacity. The generating capacity actually installed in industrial plants, he says, is only that which management (un-

familiar with power problems) has seen fit to install with economic conditions as they are now and in the face of strong public utility sales pressure. After an exhaustive analysis of the situation, Mr. Harkins advances the following conclusions:

"Modern technical developments in higher steam pressures and mercury-vapor cycles make available more and more surplus electrical energy from industrial steam flow, and this technical development favors the generation of electricity in connection with industrial processes.

"The steam flow to industrial plants is of such magnitude and the industrial plants are so located that the larger part of future electrical generating capacity should probably be installed in or near these industries rather than in new condensing steam or hydro central stations.

"Co-operation between public utilities and industrial plants in the generation of steam and electrical energy will reduce generating cost and the investment in generating equipment, thus ultimately reducing the nation's power bill and resulting in the still wider dissemination and use of electrical energy, which is the basis of our industrial civilization.

"An unsound economic condition in power generation is maintained by the utilities' competitive sales campaign.

"Industrial management must be educated in the apparent paradox that small-scale back-pressure power generation is more efficient than the quantity production in condensing central stations.

"A spirit of co-operation must be fostered by public-utility executives and engineers if industrial engineering antagonism is to be avoided and public relations improved.

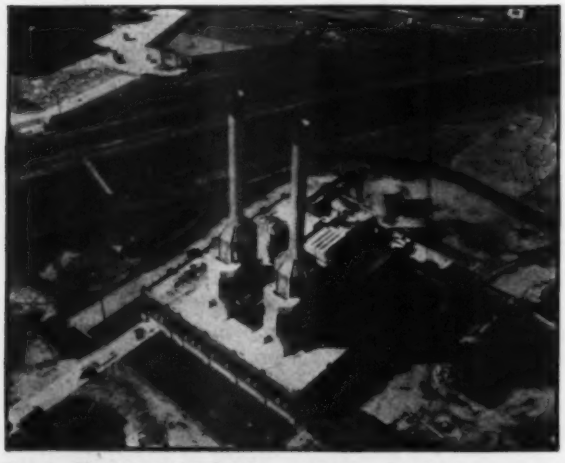


Fig. 1—The General Electric mercury vapor plant, the last word in power plant design

"A detailed survey of American conditions will probably prove, and the success of the Union Générale Belge d'Electricité indicates, that a program of co-operation will be successful."

A table by A. R. Smith of General Electric Co., reproduced by Harkins, shows how an industrial steam flow of 400,000 lb. per hour at 200 lb. pressure could yield no surplus energy, in a particular plan under investigation, yet 42,000 kw. was obtainable, together

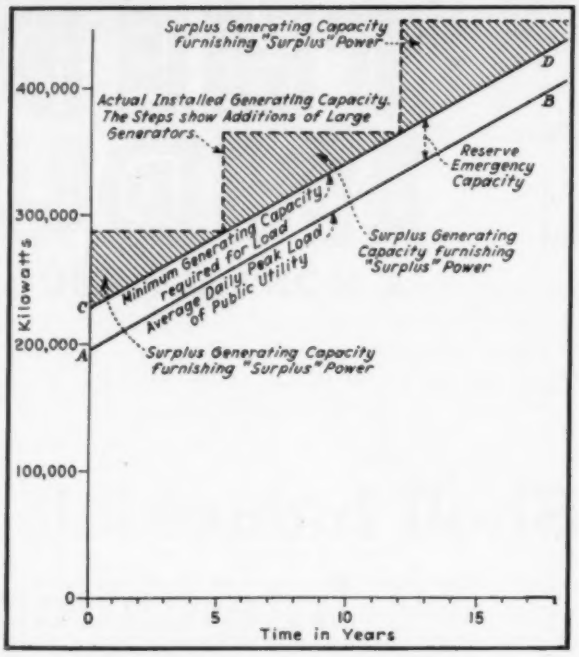


Fig. 2—Large generating units of a public utility increase the capacity in steps

with the 400,000 lb. of process steam, through present technology using a mercury-vapor plant. If all back-pressure and industrial turbines built in 1927-8-9 had been built for 1,200 lb. pressure and arranged to supply the same heat, they would have had an additional generating capacity of one-fifth of the condensing turbines made in the same years. If they had been of the mercury-vapor type, they would have had an additional capacity of one-half the condensing turbines built in that period.

From these and other data, Mr. Harkins concludes that with industrial capacity now 28 per cent of utility capacity, it is obvious that any large increase in industrial capacity is of such magnitude as to satisfy the nation's demand curve for some considerable future period, and leads to the startling conclusion that the larger part of future electrical generating capacity should be installed in or near industrial plants.

The paper goes on to point out that although the utilities' interconnections in great pools give them advantages of emergency supply, diversity and reduction of spare equipment, many industrial plants, because of their use of exhaust heat from the prime movers, operate at about 80 per cent thermal efficiency, as compared to the 25 or 30 per cent attained in central stations. The industrial heat-using peak or time of lowest power cost, moreover, coincides with the peak load on utility systems—that is, on a yearly basis.

Utilities are reluctant to consider co-operative schemes for many reasons, such as hazards to service, complication of supplying process steam non-electrical service, financial hazards of joint ownership, variations in efficiency of by-product generating plants due to process variations, legal questions and state and federal regulation of public utilities. Yet some utility executives recognize that the industrial's payroll helps sup-

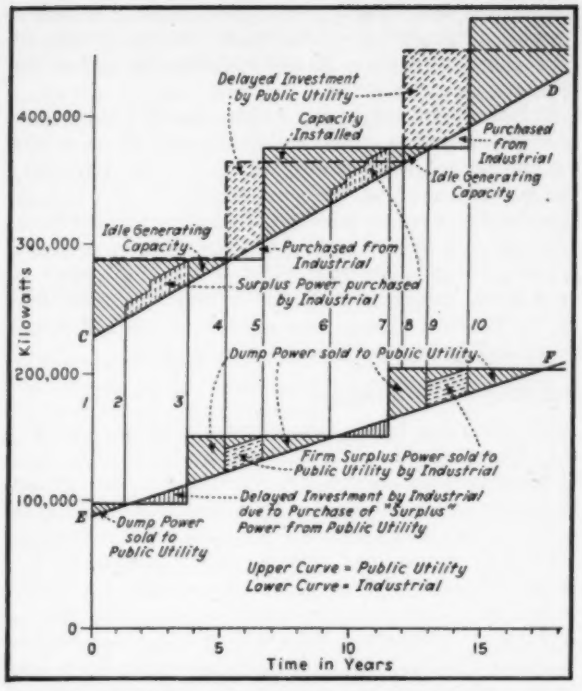


Fig. 3—How utility and industrial may both delay investment by power interchange

port the utility and that co-operation may have broad economic and social results for good.

Much controversy in reaching agreement for interchange of steam and power is aroused by misunderstanding of the value of a unit of energy, whether "firm" or "dump." The fundamental principles have been well explained by W. B. Skinkle, engineer, Pittsburgh District Power Committee, Subsidiary Companies of U. S. Steel Corp. Figures 2 and 3 have been reproduced from his discussions. Figure 2 shows how the large generating units of a public utility increase the capacity in steps.

Figure 3 shows how industrials of large capacity and utilities may both delay investment and avoid installations of capacity far beyond requirements by a mutual and co-operative exchange of power.

Examples of Co-operation

When we turn to actual cases of co-operation between utilities and industrials in this country, we find that there is no such thing on a national scale but that there are some isolated instances. In England an integrated system known as the "Grid" is in the formative stage but there are no definite data available on it. In Belgium a regional system has been in operation about five years and it is intended that in time all utility, industrial and municipal generating plants will be tied into one system. Another interesting regional co-operative arrangement of great significance has been carried out at Sydney, Nova Scotia.

Here a power company, several industrials and a municipal lighting plant co-operated, with the approval of the Board of Public Utilities, resulting in satisfactory service, economy and earnings. Steel plant and mine operations are scheduled so that necessary power can be provided at minimum cost. The effect of a proper rate schedule on demand and usage has been extraordinary. Substantial economies have resulted; refuse fuels can be used for making power; the reduced rates tend to increase domestic use.

In other parts of Canada, industrial plants provide standby service; hydro plants supply power for electric boilers. Many interesting hydro and steam combinations are familiar to paper mill men in Canada.

Parallel Operation

The simplest case of co-operation occurs when the industrial secures part of its power from the utility and operates its own generating equipment in parallel with the utility, but does not feed back. So many installations of this kind exist, says Mr. Harkins, that it may be called common practice. Many additional installations of this type would be economically attractive if it were not for the burden imposed by the necessity for the industrial to install spare generating equipment or pay a burdensome demand charge to the utility because of outages of its one generating unit. Despite the high availability of modern equipment, such a demand charge must be included when considering the installation of a single unit.

Utilities defend the demand charge by pointing to the standby equipment needed in the event of a breakdown of the industrial and for other economic reasons. Yet some engineers believe that with a number of industrials feeding into a transmission system the statistical effects, diversity factors and load factors would eliminate this burden.

Industrials Selling Energy to Utilities

Turning to the industrials that sell energy to utilities, we find the subject "so shrouded in secrecy that no quantitative data can be secured or given." An article in *Power* lists 13 plants selling energy but gives few

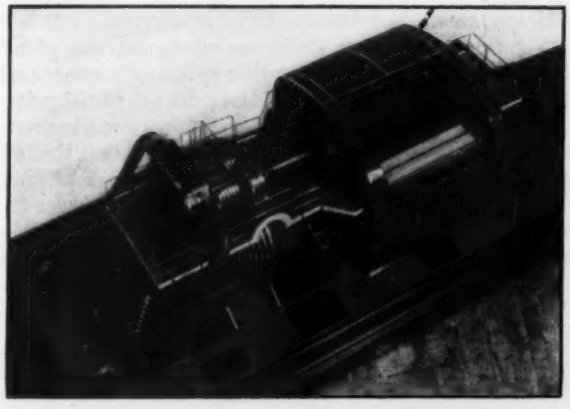


Fig. 4—Model of a vertical-compound 110,000-kw. unit to be installed in an industrial plant—the Ford Motor Company's Rouge plant, not a central station

data on the way in which it is done. These plants include paper and textile mills, mines, a cement plant, motor companies and so on. Steam plants, hydro-electric plants and Diesel plants supply this energy.

A drug manufacturer buys steam from the local utility, generates electricity from this steam and sells the power to the utility.

An Eastern utility bought energy from an industrial that was located on its system in such a way that it could supply energy to great advantage during peak periods or when transmission troubles occurred. This was a straight sale, subject to call by the utility dispatcher, an example of a utility using industrial capacity as shown in Figure 3.

One utility has an interconnection with an industrial through two transformer banks owned by the utility but the industrial is billed for rental of one bank. Ordinarily, there is no net exchange; no formal contract exists, except a letter accepted by both and agreeing on the price per kilowatt-hour. Each stands ready to pick up loads in an emergency.

Several large scale co-operative agreements are worth study. For example, the Deepwater station contains two 1,200-lb. generating units, each owned by a different utility, also a turbo-generator that exhausts to evaporators. These evaporators supply vapor up to 400,000 lb. an hour to an adjacent industrial plant for process work. The entire operation has been successful and the willingness of all concerned to co-operate has made possible the adjustment of occasional difficulties that could not have been foreseen at the beginning. The industrial has secured the benefit of skilled power plant operation without its burden, although at the cost of some flexibility in operation.

Another instance in point is the Southern oil refinery at which a generating station, technically a utility, was built. This plant uses waste fuels from the refinery to generate power; it is not a true utility, in that it confines all operations to its own property and its customers come to it with pipe lines and electrical connections.

Again a careful survey of steel mills indicated that a saving of from $0.43 to $1.36 per ton of steel could be made by selling coke-oven gas and purchasing electricity. Based on this, an exchange of energy between steel mills and utilities has been worked out in the Chicago area.

The General Electric Co.'s new mercury-vapor plant at Schenectady is an outstanding co-operative venture. It was built by the industrial, leased to the utility for operation and supplies 630,000 lb. of steam an hour to the factory and 26,000 kw. to the transmission line of the utility. The utility admits that this power has for it a definite value per kilowatt, hence fixed charges on such investment are credited to the industrial. This amount is less than the rental. The utility allows a credit for each kilowatt-hour produced by the plant. It must accept all power offered at any time. The utility sells all the power that the industrial demands at regular rates, while the excess cost (covering rental, operation and fuel) over and above the two credits allowed the industrial is charged to the latter as its cost of steam.

Some of the foregoing factors have been discussed by Vern E. Alden, in the paper mentioned at the beginning of this article. But he mentions others that must be taken into account. Many important power savings are related, he says, not to generation but to utilization. Studies of these must precede analyses of new plants. He discussed the value of flexibility in operation. He pointed out that fixed charges constitute so large a part of the cost of steam and power that it is seldom possible to justify the installation of new equipment to work on the same cycle and replace existing but less efficient equipment.

It is doubtful, thinks Mr. Alden, that five years from now the executives of any stable industry or the utility serving the related territory will view with equanimity the generation of as much as 200,000 lb. of steam an hour at low pressure and high load factor and with no generation of byproduct power. The ideal, he says, is a utility power plant supplying steam and power to each large industrial district. A major consideration in the location of any new generating station should be its ability to supply steam to industries.

Opinions on Interchange

The foregoing points have been widely discussed since they were first brought out. Kerr Atkinson of Jackson & Moreland has emphasized the need for the utilities to supply combined steam and power service to industrials, also the importance of industrial generating capacity for peak load service. Many industrials will otherwise take independent action and build new plants at the earliest possible moment, thus removing from the utilities' calculations a large amount of industrial load that the utilities may not be able to regain for a long time.

Guy B. Randall has called attention to the possible utilization of diversification of industrial capacity by organizing the public utility as a common carrier for the interchange or pooling of power. He points out the fact that a certain extremely prosperous utility company in New England never owned a power plant but acted solely as a carrier. If such schemes cannot be carried out, it may still be possible to connect industrial plants by lines leased from utilities. Mr. Randall believes that when a large number of industrial power plants are connected into a pool, the diversification factor would operate to change what would be "dump" power from any one plant into "firm" power from the point of view of the pool.

This question of obtaining firm power from industrials seems to be one of the principal factors, from the point of view of many utility engineers, who do not always see eye to eye with Mr. Randall on the importance of the diversity factor in generation as well as in distribution. C. F. Hirshfeld, of Detroit Edison Co., who represents the feeling of an open-minded and progressive utility, recognizes the advantages and possibilities of interchange and has studied it for many years. He feels that individual cases, not mass statistics, must be studied. More important to him is the legal aspect of the problem. In some co-operative ventures, legal questions might be important enough to force an industrial plant thus connected to operate according to the demands of the utility system rather than for its own needs.

Some utility engineers feel that the possibilities of power interchange are limited to a few plants with large steam and small power demands. Frank T. Leilich, Maryland Air Conditioning Corp., suggests that utilities consider putting in non-condensing stations at suitable points, using steam for refrigeration in air conditioning (which is now frequently used in

industrial processes) and using Diesel engines to carry base load in warm weather. T. A. Burdick, now of Business Journals, Inc., points to the need for less insistence on fuel economy and more insistence on lower capital charges by simplification of plants. So far as a particular company's power costs are concerned, he says, it seems more reasonable that worthwhile results can be obtained by attacking the major item of cost, fixed capital charges, than by hammering away at a diminishing minor item.

How Does Power Interchange Affect the Paper Mill?

In the light of the foregoing brief survey of the situation at present, let us now consider what, if anything, it means to the paper industry.

It certainly should be clear that the paper industry must take an interest. Here is an industry with an installed power capacity of some 2,900,000 kw., over 7 per cent of the total installed capacity in the United States. For 24 hours a day, its power plants generate tremendous amounts of process steam and produce by-product power at heat rates of the order of 4,500 B. t. u. per kilowatt-hour delivered, a rate less than half of that attained by several steam central stations.

Now let us suppose that, using the most modern technic, perhaps a mercury-vapor plant or a high-pressure and high temperature steam plant or some steam and Diesel combination, the paper mill could generate more electric power than it could use from the process steam it needed, at a cost even a little lower than before.

Suppose further, that by some means the paper mill could be assured that its surplus power could be sold to a power pool for a price that would return a reasonable yield on the investment in the more efficient generating capacity. Suppose further that the paper mill needed a new power plant, perhaps because the old one was obsolete; or that a whole new mill was to be built. Such conditions are bound to occur in the paper industry in the near future. Does it not seem, then, that from the side of the industry there might be some advantages in an interchange arrangement, especially in view of the possibilities suggested by Mr. Harkins?

Let us look now at the utility side of the picture. The present central station output is not far from the average load of 1929—only about 5 per cent below it, according to *Power*. From 1931 to 1934 only 1,600,000 kw. of capacity have been installed by the utility industry, whereas before 1929, at least 2,000,000 kw. of capacity were needed every year for a long period. A business pick-up is ahead of us; design staffs of consulting engineers and utilities have dwindled to almost nothing and many of the old experienced men who were in close touch with the trends have gone; it takes 13 to 24 months to get new power plant equipment. Much existing utility equipment is rapidly growing obsolete; much of it cost $80 or $90 a kilowatt when installed, whereas now it would cost about $60; the utilities have been severely spanked by economic trends as well as by the politicians and the end is not yet. Is it any wonder that some utilities should gradually unbend and admit that perhaps they might be able to get some very cheap standby or peak load or firm power by means of an interchange arrangement? It looks to some engineers as though there would be much more unbending.

Thus we come to the crux of the whole matter. How much could an industrial plant afford to sell surplus power for? How much could a utility afford to pay for it? Would that be enough to repay the industrial for the additional investment in more efficient equipment to produce the surplus power? As to figures, it is reported that one of the newest and most up-to-date power plants in industry sells power to its local utility for one mill per kilowatt-hour. This seems to be just about the fuel increment to the utility. On the other hand, plants are known to have sold power to utilities for as much as 3½ cents a kilowatt-hour.

The interest of the Tennessee Valley Authority in the English Grid is a new factor in the situation. One of the high officials of the Authority, David E. Lilienthal, has recently returned from England, presumably with some information on the Grid. If this organization, as part of its "yardstick" policy, should attempt any experiments with a pool of power in its terrain, as it has been repeatedly urged to do, the consequences will be tremendous, especially for the conservatives in the utilities. The principal effect of such an experiment would probably be a further reduction in power rates for the domestic consumer. In any case, it will be well for industry and the public utilities both to hold back from any power interchange program that does not lead directly to lower domestic power rates and wider application of electricity in domestic circles.

Steinmetz used to dream of a great network of transmission lines covering the country, with every little mountain brook, every little factory, every central station feeding power into it. His dream is not so far from realization. Of course, a sudden successful attempt to obtain atomic energy cheaply and directly might result in the creation of a multitude of tiny power plants that could be set up where power was needed, thus eliminating the need for transmission systems, pools of power and generating plants of large size and high efficiency. No one at present can say, in the light of recent attempts, that such a thing may not happen. But its probability within the next ten years seems very small. Power engineers will probably be fairly safe if they assume that as a working basis.

It is difficult to see, on that basis, how all industry and particularly the paper industry with its 24-hr. load, can evade the challenge of surplus power that has been thrown down by the power engineers. Perhaps it will have to be met, as has been suggested, by forgetting fuel economy, by using more plants designed for simplicity and low capital charges, by drastically reducing transmission and distribution costs. But however the problem is solved, the paper industry is bound to be involved in the process. There will be much argument and heat, as already stated. Knowing paper mill engineers, it is believed they can produce much light on the subject. In any event, considering the facts and opinions presented here, it seems that any individual or industry taking a keen interest in the problem and contributing something toward its solution has nothing to lose, but instead has much to gain.

Valves for the Pulp and Paper Mill Power Plant

By WILLIAM HEILIG
The Wm. Powell Company

POWER, its generation and ultimate economical utilization, has been a problem from the first small steam boiler to the present giants developing thousands of boiler horsepower. Much has been done on the steam engine to improve its work cycle. The turbine, with increased efficiency, is operated to transform steam into useful work more economically. Constant experimentation has proved that by superheating to temperatures above saturated steam, more work units can be obtained, thereby making this latter application more economical. Not alone have boiler capacities been increased but pressures and temperatures also.

With the tremendous expansion and marked advance in high pressure, high temperature application in steam power plants, and a prevalent engineering trend to still higher temperatures and pressures, equipment for such service has assumed special importance. The use of proper materials is an important adjunct in the application of increased operating conditions. Factors of safety must be considered on any pressure containing vessel. Here not alone pressure is taken as a factor but also temperature. Many good alloys and pure metals can be wrought into pressure containing vessels which are satisfactory for high pressures, but where temperature must be considered, this long list of alloys is limited to a very few. Research progressed for years under the guidance of national engineering bodies and also under independent endeavor, so that today where temperatures on boiler installations seldom exceed 850 deg. Fahr. there has been developed quite a variety of materials admirably adapted for such items as valves, piping and fittings.

Confining the subject to valve design and materials to withstand present day operating conditions in the paper mill power plant, misapplication of product frequently causes needless expense and continual replacement of worn parts. Consequently, valves must be selected to meet the actual service involved. For handling steam, air, gas, oil, or water, various types of valves are available for individual pressure and temperature conditions.

Valve Selection Recommendations

For certain types of service gate valves should be used; and for other services, globe valves—depending entirely on whether the valves are required to do any throttling below the actual capacity of the seat area. Figure 1 illustrates a bronze globe valve with hard rubber or vulcanized composition disc and a flat integral seat for use in small sizes in low pressure and low temperature water service. The disc of such a valve can be renewed easily and quickly, the seat refaced, but this valve is not the type for throttling conditions or high pressure service.

Figure 2 illustrates a bronze globe valve with a regrindable and renewable seat and disc of nickel-

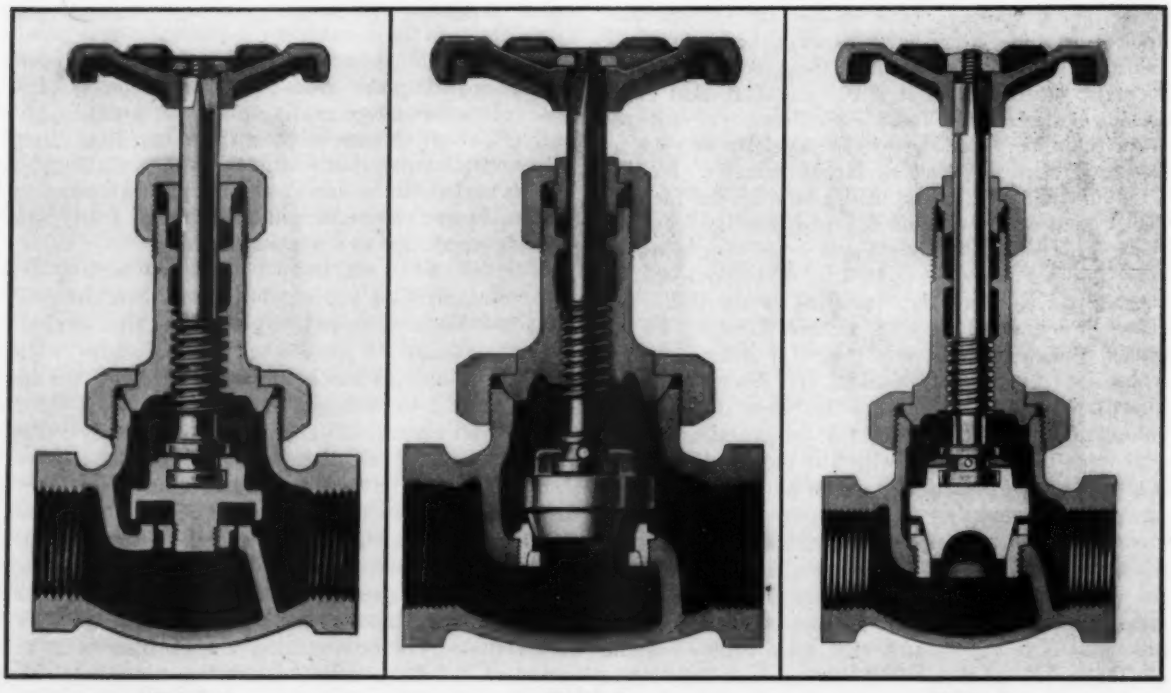


Figure 1 Figure 2 Figure 3

bronze. Although better adapted for throttling service than the Figure 1 valve, it is not suited for throttling conditions. The seats and discs will wire-draw and eventually cause the valve to leak.

Wherever throttling is required of the valve, a globe valve with plug type disc having wide engagement with the seat provides the longest life. The long tapered seating surface of the Figure 3 valve is well adapted for such conditions. It is desirable to use a hard, tough surface for both the seats and discs. There are certain nickel bronzes, with copper predominating, that offer considerable hardness—yet few of them have much ductility. For extremely high pressures and temperatures it is desirable to use Monel metal or high silicon Monel, or a combination of Monel metal with hardened stainless steel.

Gate valves should never be used for throttling service. They will be useless after the seats and discs wire-draw. Gate valves are furnished in the inside screw non-rising and rising stem types, or in the outside screw rising stem type. The position of the rising stem indicates whether the valve is opened or closed, but the non-rising stem valves are usually tighter at the stuffing box and require less packing. For controlling corrosive liquids or gases, or for service requiring frequent opening and closing, the outside screw rising stem design is preferred. A gate valve should be used for carrying liquids which are almost non-compressible, and where full flow is desired as this type offers less obstruction to the flow in the line.

Features of design is important from an economical standpoint. Valves are produced in which the various parts can be renewed when worn, or at least refaced and reconditioned to prolong their useful life. It follows, therefore, that accuracy of workmanship is imperative. All parts must be made interchangeable and be so guaranteed by the manufacturer. In the event worn parts must be renewed, they then can be replaced with minimum expense and labor.

Pipe ends on screwed valves should have threaded sections of sufficient depth and be threaded to gauge. A long thread depth is desirable especially in screwed gate valves because if the pipe has a long loose thread, when screwed into the body it will not strike the seat and distort it. Pipe ends should be threaded so that the pipe is horizontal when screwed into both ends of the valve. This will eliminate distortion in the valve body. Flanged end valves should have flange faces perfectly parallel to one another.

Small size valves are desirable with union bonnets, especially if the valves have composition or soft metal discs that are subject to frequent renewal. The union bonnet permits easy removal of the upper valve structure for easy access to the seats and discs. All valves should have ample packing space to make frequent repacking unnecessary and to prevent leakage at the stuffing box. The section of the valve spindle passing through the valve stuffing box should present a smooth surface to offer minimum wear against the packing. Ample thread engagement should be provided between the valve stem or spindle and valve bonnet when the valve is being closed. All valves should be designed to permit the valve to be opened wide and in this position a cut-off should be provided on valve spindle to engage against the bonnet, preventing flow from valve body to packing chamber (See Figure 4). This permits the valve to be repacked under pressure when fully open.

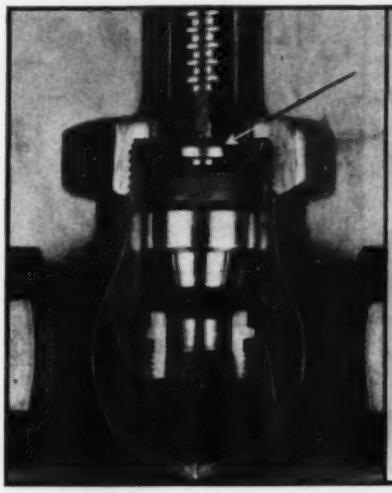


Figure 4

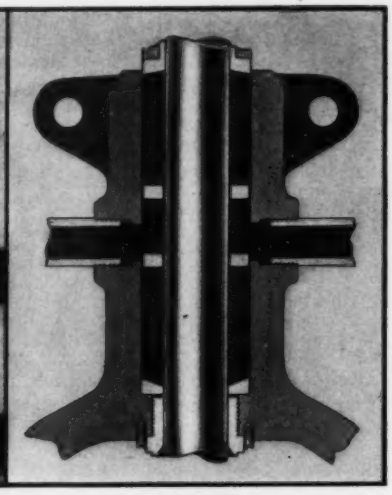


Figure 5

Valves installed in inaccessible places can be manually operated by special gearing attached to the valve bonnet and engaging with the spindle, with an extension stem, or with a chain wheel attached to the handwheel. Very large size valves difficult to operate manually, or small size valves in inaccessible positions can be procured for remote operation by an electric motor or air motor, or by a hydraulic or air cylinder. There is available a variety of electric motor driven valve operators with many types of remote controls. Automatic valve control saves time and labor. Opening and closing valves by hand is unsafe in cases of emergency because hand operation requires considearble time and automatic operation requires seconds. Moreover, automatic valve control brings every valve in the plant under instant control, responsive to the touch of a finger. A step to the control station, a glance at the red and green indicating lights showing the position of the valve, a push of the button and the desired valve is opened or closed quickly. Motor operated units can be obtained for operation on a-c. or d-c. for practically all commercial voltages. Control of the valve can be obtained by push button control or similar device, and can be controlled by float switch, thermostat, pressure regulator, etc.

Influence of Temperature and Pressure

It must be remembered that valve ratings are commensurate with design. Although pressure ratings on valves in most cases are quite conservative, it is best practice to ascertain that the rated working pressure of the valve is high enough to withstand the pressure involved. Temperature, as well as pressure, governs the type of metals from which the valves should be

made. Valves made from a bronze having the following chemical analysis are limited to temperatures not over 500 deg. Fahr.

Copper	83.0% minimum
Tin and Zinc	8.0% minimum (combined)
Lead	6.0% maximum

Bronze valves made from the following analysis can be subjected to temperatures up to 550 deg. Fahr.

Copper	84.0% minimum
Tin and Zinc	9.0% minimum (combined)
Lead	2.5% maximum

Iron body valves, because of the definite limitations of gray iron or so-called semi-steel, are limited to 450 deg. Fahr. For temperatures above 450 deg. Fahr. it is necessary to resort to either a cast or forged steel valve. Limitations of these alloys have been determined because of their marked decline in tensile characteristics when subjected to temperatures in excess of those mentioned above. Cast or forged carbon steel can be relied upon to withstand temperatures to 850 deg. Fahr., but for service above this temperature it is advisable to use alloy steel.

Below are given the chemical and physical properties of alloy steels desirable for higher pressure and temperature service.

Carbon Steel

Approximate chemical analysis:

Carbon	0.15 to 0.45%
Manganese not under	0.50%
Silicon not under	0.20%
Phosphorus not over	0.05%
Sulphur not over	0.06%

Approximate physical properties at room temperature:

Tensile Strength	70,000 lb. sq. in. minimum
Yield Point	36,000 lb. sq. in. minimum
Elongation in 2 in	22% minimum
Reduction of Area	30% minimum

Carbon Molybdenum Steel

A carbon steel with 0.40 to 0.60% molybdenum added.

Approximate physical properties at room temperature:

Ultimate Tensile Strength	80,000 to 90,000 lb. sq. in.
Yield Point	55,000 to 65,000 lb. sq. in.
Elongation in 2 in	16 to 22%
Reduction of Area	35 to 45%

Chrome Nickel Molybdenum Steel

A steel with chromium	0.65 to 0.95%
nickel	1.75 to 2.25%
molybdenum	.20 to .30%

Approximate physical properties at room temperature:

Tensile Strength	95,000 to 105,000 lb. sq. in.
Yield Point	65,000 to 70,000 lb. sq. in.
Elongation in 2 in	15 to 20%
Reduction of Area	27 to 32%

Chrome Molybdenum Steel

A steel with chromium	4.0 to 6.0%
molybdenum	0.40 to 0.65%

Approximate physical properties at room temperature:

Tensile Strength	110,000 to 120,000 lb. sq. in.
Yield Point	80,000 to 90,000 lb. sq. in.
Elongation in 2 in	16 to 20%
Reduction of Area	45 to 55%

Chrome Tungsten Steel

A steel with chromium	4.50 to 6.50%
tungsten	0.75 to 1.00%

Approximate physical properties at room temperature:

Tensile Strength	110,000 to 120,000 lb. sq. in.
Yield Point	85,000 to 90,000 lb. sq. in.
Elongation in 2 in	18 to 22%
Reduction of Area	45 to 55%

There are many good alloys in addition to high grade carbon steel which can be produced in either castings or forgings for the manufacture of fittings, valve bodies, bonnets, and trim parts within the valve. The limitation of carbon steel at high temperatures was determined after long time tensile tests which proved the stress limitation. The addition of alloying elements to carbon steel, such as chromium, molybdenum, and tungsten improve the physical characteristics at high temperatures.

The Manufacturers Standardization Society of the Valve and Fittings Industry has sponsored the coalition of test data for arbitrarily setting 850 deg. Fahr. as the maximum temperature for which carbon steel should be recommended in the form of valves and fittings. Steels must actually maintain certain toughness at elevated temperatures in order to resist the erosive action and shock encountered in every day service. As mentioned, there has been a tendency to improve the physical properties of cast and forged steels for valve bodies and bonnets, and certain improvements made applying to alloys for better adaptation to valve seats, discs, and stems.

There are alloy trim materials for varying conditions. Starting with feed water lines, valves for this service can be classed in one group. For temperatures over 450 deg. Fahr. and pressures approximating 150 lb., it is advisable to resort to a cast steel valve. For trim materials for boiler feed service and low pressure, a high grade bronze seat, disc, and stem can be used.

For higher temperature service some of the low nickel bronzes are used advantageously to resist erosion of seat and disc faces; and similarly Monel metal and the so-called synthetic Monel metals in which either tin or silicon are added in greater amounts than found in standard Monel metal. Standard Monel metal or stainless steel of the 11½ to 13 per cent straight chrome iron variety are satisfactory for valve stems. For stainless steel seats and discs it is advisable to use a suitably heat treated low carbon stainless steel against a high carbon material of approximately the same chromium content. The high carbon imparts considerably greater hardness and offers a hard material against a softer material.

For steam service, depending, of course, upon the ultimate pressure and temperature, lower pressure valves can be suitably trimmed with Monel metal or some of the synthetic Monel metals referred to above. Nitrided steels can also be used, but their use depends entirely on the ultimate temperature. The case hardened surface of nitrided steels corrodes when subjected constantly to saturated steam, thereby limiting the life of either the seat or disc. Stainless steel is not usually used for steam service as it has a tendency to seize when relatively dry gases pass through the valve at elevated temperatures. This seizing action can be expected from any of the high chrome or high chrome-nickel iron alloys. For extremely high temperature and high pressure service of 850 deg. Fahr. and above, a technique has been worked out whereby a base material—preferably stainless steel—is fashioned into the form of seat rings or discs. To the faces contacting one another an alloy material can be welded, as in the application of Stellite to the base material. Stellite, which has long been used for cutting tools possessing a hard, wear-resisting surface, can be used on valve seats and discs.

Accelerated wear tests under both pressure and temperature prove that this material is quite desirable for extreme service conditions.

Valves designed with bolted bonnets require gaskets between the body neck flange and bonnet flange. Where high pressures and temperatures are encountered, gasket material should be specified carefully. There are various types of gasket materials, some of the asbestos type and a varying lot of metal gaskets, some made of corrugated metal in which just a metal face is relied upon to make a tight joint between the two flanges. Other metal gaskets can be obtained with asbestos inserts, and still others are obtainable made from a soft Swedish iron having flat faces.

Care should be taken that on high temperature service the gasket material withstands the same working conditions as the valve.

Bolting material also is important. If temperatures are above 500 deg. Fahr., it is advisable to use a high temperature bolting material. Class C type high tensile bolting material (A. S. T. M. Spec. A96-31) is satisfactory for temperatures up to and including 800 deg. Fahr. For temperatures above 800 deg. Fahr. it is advisable to use a slightly different alloy steel presenting less loss in physical characteristics at high temperatures.

Stem packing is graded for water or steam service at varying temperature conditions. The packing must be made of materials that will not cut the valve stem or spindle. It must incorporate a lubricant, such as graphite; and must not pack down too hard after long service. Some packings are obtainable molded directly to the shape of the stuffing box; others can be procured in plastic or semi-plastic form.

In most instances, large steel gate and globe valves are provided with a condensing chamber directly below the stuffing box. Lantern rings can be substituted for condensing chambers. This permits sufficient packing at the bottom of the stuffing box with the lantern ring or spacer above the packing, and a space for an equal amount of packing above the lantern ring (See Figure 5).

In conclusion, it is well to remember the following factors when selecting valves for the paper mill power plant or for any installation. Firstly, determine the proper valve design for your operating conditions; that is, gate, globe, angle, check, etc. Secondly, keep in mind that the actual working pressure and temperature determine the proper materials from which the valve and valve trimmings should be made. Thirdly, remember that the engineering departments of any of the valve companies are always glad to co-operate in the selection of the proper valve design and materials to meet individual operating conditions.

Suggestions for Modernizing the Paper Mill Power Plant

W. F. SCHAPHORST, M. E.

MODERN paper mill power plants are so much more economical and efficient than those of ten years ago that owners of old plants are showing concern over the state of affairs. They are wondering what can be done, if anything. Will it be necessary to start all over again and build a new power plant, or can the present plant be rehabilitated? Can it be made capable of competing with modern plants? These are important questions.

In most instances the old plant, particularly the boiler plant, can be modernized without great cost. In some instances it can be made better than certain so-called modern plants. And, what is of prime importance, the cost of the modernization will be considerably less than would be the cost of a new plant.

Any thinking person will realize that heat will pass through an old boiler plate and an old tube as readily as it will pass through a new plate, provided the plate is kept clean. As a matter of fact there should be a slight improvement with age because boiler plates and tubes usually become slightly thinner. The boiler which has a heating surface that does not change with age is a rarity. Therefore, arrange to keep the tubes perfectly clean inside and out. The modern method is to keep boiler water so pure that no scale will be deposited. Install cleaning devices. By installing a soot cleaner all ash and soot may be kept off the outer surfaces of the tubes.

Put the boiler itself in A1 condition, and then consider and improve combustion. It is as important to have complete and proper combustion as it is to have perfectly clean heating surfaces.

Almost invariably combustion efficiency can be improved by increasing furnace volume. This is accomplished by installing modern boiler baffle walls and sometimes modern furnace lining. There must be no air leakage through boiler baffle walls. And there must be no heat leakage through the outside boiler walls. Proper baffle wall design will give the correct gas velocity through the passes of the boiler. There will be no slagging. Be sure to avoid cracking or breaking. Don't install cheap equipment.

A steam superheater might be installed. Perhaps a feed water heater, an automatic feed water regulator, a modern damper regulator, steam purifier, steam traps, automatic combustion control system, pump governor, steam flow meter, etc. All of these devices are of great importance in the modernization of paper mill power plants. It is possible to do almost anything to an old boiler plant with the exception of making the old boiler stronger. Such a thing can be done, of course, but it is not economically practicable.

Design and Use of Clutches in the Paper Industry

By GEORGE H. PRINGLE, Mechanical Engineer
The Mead Corporation

CLUTCHES in common use today for engaging or disengaging one rotating machine member from another fall into one of three types.

The first is the positive type, the most common of which is the jaw clutch with either two directions of rotation, square teeth; or one direction of rotation, spiral teeth. A jaw clutch with square teeth is shown diagrammatically in Figure 1.

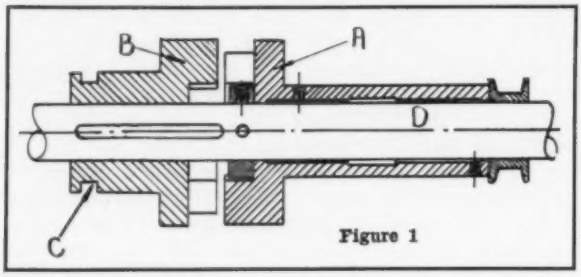


Figure 1

This clutch consists essentially of two parts, *A* and *B*. Part *A* is a loose bearing fit on shaft *D*, the surface in contact with the shaft being lubricated and in some cases bronze bushed as well. When the clutch is disengaged as shown, part *A* can rotate and the shaft remain stationary. This part is kept from moving longitudinally by the thrust collars as shown. The long sleeve on part *A* is for mounting and keying to it the driving pulley, gear or sprocket. Part *B* is a sliding fit on the shaft *D* and is keyed to it, thus turning with it. The groove *C* in part *B* is for attaching toggle and lever arrangement whereby this part can be moved backward and forward on the shaft *D*. Parts *A* and *B* have teeth, or jaws, and recesses which go into mesh when part *B* is moved forward on the shaft, and the whole rotates as one unit. When part *B* is brought back by means of lever and toggle attachment, these teeth disengage and part *B* and shaft *D* remain stationary.

The plain friction clutch, of which there are several types, is second. The single disc, multiple disc, expanding ring, contracting band, and various kinds of cone clutches come under this one general heading.

Due primarily to its merits, the disc clutch, both single and multiple, is by far the most common in this classification. A plain single disc friction clutch is shown diagrammatically in Figure 2.

This clutch consists of a sleeve *A*, either bronze lined or plain, a sliding fit on shaft *G*, the surfaces coming in contact being lubricated. To this sleeve is keyed the driving pulley, gear or sprocket *H*. In some designs this sleeve is made part of the hub of the driving pulley or gear. The clutch collar *B* is keyed to the sleeve *A* and has lugs on it which engage with lugs on the wood or asbestos filled friction disc *C*, thus causing the friction disc, which is a loose fit on the sleeve *A*, to rotate with the pulley, but still leaving the disc free to vibrate sideways. The hub *D* is a sliding fit on shaft *G* and is keyed to it thus rotating with it. The hub *D* can be moved longitudinally by means of toggles, attached to the groove in spool *E*, and levers. The movement of spool *E* is also transmitted to the bolts *K* that fasten the follower plate *F* to the hub *D* through levers *J*.

The clutch is put in by causing spool *E* to move towards the pulley. Hub *D* then grips the friction disc *C* on one side, and the follower plate *F*, through levers *J* and bolts *K*, grips the disc on the other side. This causes the shaft *G* to rotate with the pulley, the whole assembly moving as one unit.

The clutch is disengaged by moving spool *E* away from the pulley. This operation brings hub *D* away from the friction disc *C*, the springs on bolts *K* causing the follower plate *F* to move towards the pulley when the tension is released in the levers *J*. Thus the friction disc is left free to rotate alone.

The main principles of construction and operation for both single and multiple disc clutches are the same except that the multiple type has more than one friction disc and is of heavier construction throughout. This multiple disc construction is used for larger drives instead of increasing the diameter of the single disc. The increased friction surfaces required for driving are obtained by using the multiple discs. A plain multiple disc friction clutch is shown diagrammatically in Figure 3.

The third type, a more recent development over the plain friction disc, is the magnetic friction disc clutch. In this type, the friction surfaces are held together by the direct pull of an electro-magnet, the coil being energized by direct current and operated by push button control. A single disc magnetic clutch is shown diagrammatically in Figure 4.

The driving hub *A* is keyed to the driving shaft *L*. To this hub is bolted field *F* containing coil *C* and friction ring *S* with friction lining *H*. The driven hub *B* is keyed to the driven shaft *M*. To this hub is bolted spring-plate *K*, armature *G* and service ring *J*. *R* is a bronze spacer between the hubs, lubricated as shown.

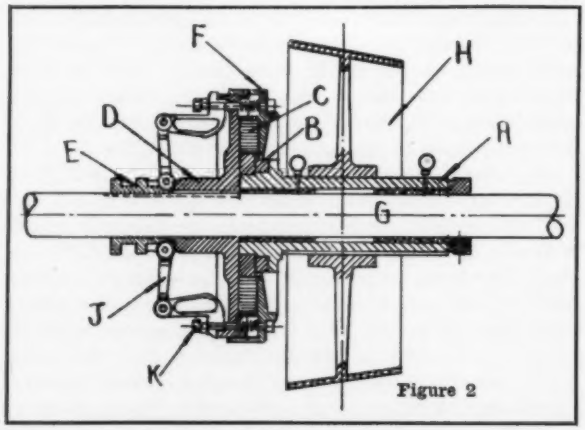


Figure 2

When the switch is open and no current flowing, the driving hub rotates, but the driven hub is stationary. When the switch is closed, current flows through conductors in conduit *P*, collector ring and brushes *D*, conductor *N* to terminal stud *E*, thence to coil *C*. This current flow in coil *C* sets up a magnetic force in field *F* and armature *G* is attracted to it. This grips together friction lining *H* and service ring *J*, thus causing the driven half to rotate, the whole moving as one unit. When the armature *G* is attracted to field *F*, it goes forward and puts the spring-plate *K* under tension, and dishes it. When the switch is pulled out, the field *F* loses its magnetism. Spring-plate *K* pulls back the armature *G*. Thus the friction lining *H* and service ring *J* are separated, and the driven half caused to become stationary again.

This type of clutch can also be constructed for an application similar to that shown in Figures 1, 2 and 3. In this instance, the hub *A* is bushed and lubricated for turning freely on a through shaft. This hub is extended and a pulley, gear or sprocket is keyed to it. Hub *B* is keyed to the same through shaft. Similarly, the jaw and plain disc clutches are applicable to the type of drive shown in Figure 4.

The magnetic clutch is also manufactured in the multiple disc type which in principle of construction and operation is the same as the single disc magnetic clutch except that the number of discs is increased.

The jaw, or positive type clutch, has some applications in the paper industry. This clutch takes the load immediately when it is thrown in and is only applicable to shafts rotating at comparatively slow speeds of from ten to two hundred revolutions per minute. At higher speeds the clashing of the teeth is severe, and destructive wear as well as breakage of the teeth is encountered. One direction form jaw clutch should not be operated at speeds over two hundred feet per minute. Jaw clutches of the plain square type tooth, as shown in Figure 1, should not be operated at speeds over fifty feet per minute.

This type of clutch is used when several drives, such as agitators for a number of tanks, are driven off one line shaft. By this arrangement any one piece of equipment without interfering with the other members of the group can be taken out of operation for repairs, or when not required. Some tanks only require agitation part of the time, or one piece of machinery may only require to be operated part time. This condition is found in starch boil tanks, clay mix or causticizing tanks, in fact, any piece of lineshafting running at

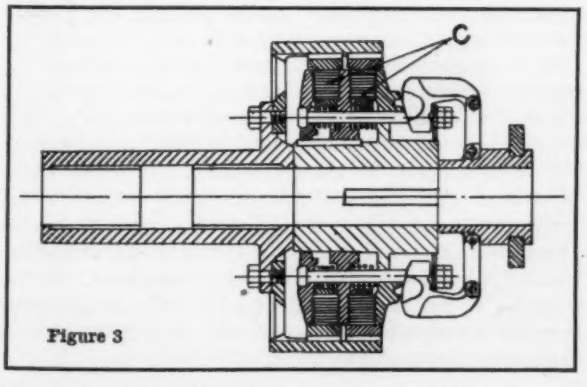


Figure 3

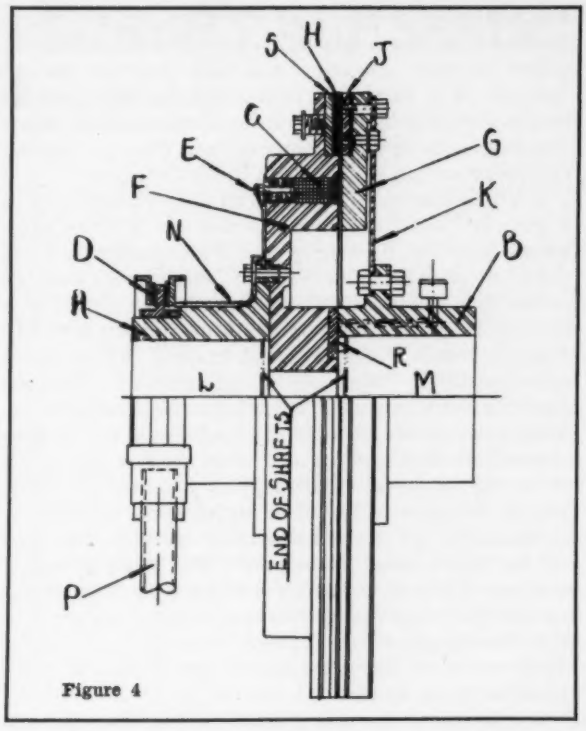


Figure 4

comparatively slow speed and driving several pieces of equipment from a group drive.

One thing to be kept in mind for any application of friction clutches is to have clutches large enough to carry the load without excessive wear of the friction surfaces. Both types accelerate gradually when thrown into contact. For most applications, the magnetic type is superior to the plain disc type. It is more compact, has fewer parts, permits remote push button control, has no end thrust, is more positive, and has a low maintenance cost.

One of the main applications of the friction clutch, either the plain or magnetic type, is on the paper machine drive when the paper machine is driven by one prime mover either steam or electric to a variable speed shaft. In this case, a friction clutch unit such as is shown in Figure 2 is installed at each section of the machine. The shaft on which the clutch is mounted connects through gearing to the intake shaft of the section of the machine to be driven. The cone pulleys on these drive units are driven by belts from cone pulleys on the variable speed line shaft. When starting up the machine, the motor or steam engine driving the variable speed line shaft can get up to full speed without carrying any load at all as all of the clutches are out and the pulleys are turning idle. The sections of the machine can be put on the line and brought up to speed one at a time, so the prime mover is not subjected at any time to a high starting load. Therefore, a large size prime mover is not required to carry this starting load, because after the machine is up to speed the actual horsepower required is much less. Likewise, if for any reason it is desired to shut down one section, for instance, to clean some paper out of the dryer section, it can be done with the rest of the machine left running.

Another application of the friction clutch is for

supercalender, winder and rewinder drives. These machines require a very slow speed for threading the paper through the rolls, and then a very gradual increase to a faster operating speed. This gradual increase is made by using friction clutches, the clutches slipping as the speed is increased and thus not causing any jerky motion which would break the sheet.

A supercalender drive is shown diagrammatically in Figure 5. The driving motor in this case is of the alternating current, slip ring type. When starting up this calender, clutches *C* and *E* are both thrown out, the motor *A* is started up at slow speed, then clutch *E* is thrown in and the motor drives through gears *B* and *D*, through clutch *E*, then through gears *F* to the bottom calender roll *G*. This is the threading speed. When the paper has been threaded through the stack and it is running true, the clutch *C* is thrown in and at the same time clutch *E* is thrown out. The stack is now being driven by motor *A* through gears *B* and clutch *C* to bottom calender roll *G*. The motor speed can now be increased to the desired operating speed for the particular paper being calendered. The gears *D* and *F* are just idling when the stack is running at operating speed. These various speed changes have been gradual, due to slippage of the friction clutches in the drive, these clutches also slipping as the motor is being brought up to speed.

A winder or rewinder drive is shown diagrammatically in Figure 6. When starting up this machine, friction clutches *C* and *E* and jaw clutch *F* are out. The motor is started up at slow speed, then friction clutch *E* and jaw clutch *F* are thrown in and the motor drives through belt *A* to pulley *B*, gears *G*, gears *D*, clutches *E* and *F*, and thence to winder intake shaft *H*. This is the threading speed for this machine. When the paper has been threaded and the rewind roll correctly started, clutch *C* is thrown in and at the same time clutches *E* and *F* are thrown out. The motor now drives through belt *A* to pulley *B* and through clutch *C* to winder intake shaft *H*, the other pairs of gears now idling. The motor can now be brought up to the desired operating speed. These speed changes have been gradual through clutches, as previously described for the calender drive.

Synchronous motors form another example for the application of clutches in the paper industry. This type of motor is very desirable on installations of two hundred horsepower or over. The leading characteristic of this motor, since its field is excited by direct current and is in synchronism with the alternator supplying it, is that the power factor may be varied over a wide range, either lagging, leading, or unity, depending on the amount of excitation to the field or rotor coils. A synchronous motor then has two distinct advantages. It can be used to drive a mechanical load, and, at the same time, it can correct the power factor of a system of induction motors.

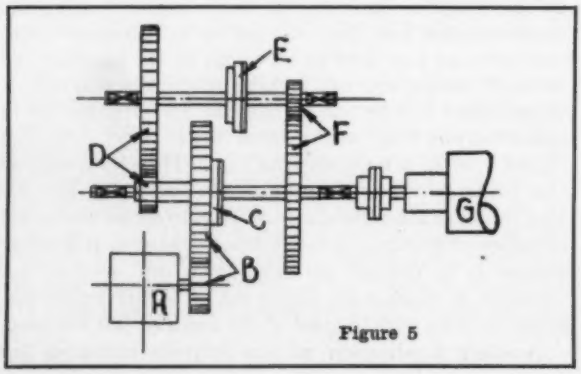


Figure 5

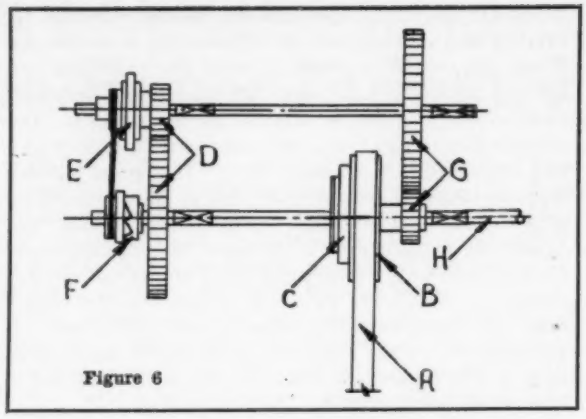


Figure 6

The main disadvantage of a synchronous motor is its low starting torque and its consequent inability to start up under full load. This disadvantage is overcome by installing a clutch between the synchronous motor and driven shaft. The synchronous motor is brought up to full speed under no load. Then the clutch is thrown in, and the load taken on by the motor gradually through the clutch. Very good examples of this application are magazine or pocket grinder drives and a synchronous motor driving a motor-generator set.

The magnetic type of clutch is very applicable for remote control as the switch controlling the clutch can be located at any distance from the clutch. A good example of this application would be a pump supplying stock to a remotely located chest in which the level is to be kept constant. In such a case a magnetic clutch is located between the pump and motor driving it. A float switch is located in the chest. When the level goes down in the chest, the switch closes the circuit and energizes the clutch and the pump starts delivering stock. When the chest fills up, the float switch breaks the circuit and stops the pump. This is desirable in many instances in preference to starting and stopping the motor. When the pump is disconnected, in the case of a synchronous motor, the motor runs as a synchronous condenser and improves the power factor.

The magnetic clutch can also be used to maintain a constant pressure in any pipe system, the clutch being controlled by pressure. If the pressure falls off, the clutch is energized and starts the pump until the top pressure limit is reached. At this moment the current is shut off and the pump cut out of service.

It is believed that the sectional electric paper machine drive is superior to the sectional clutch drive which has been described and that a direct current motor drive with a special control for "inching" the motor up to full or operating speed is better than the calender and winder drives that have been mentioned. Nevertheless, clutch drives in the case of older installations are giving satisfactory results and will likely continue to do so for many years.

Industrial Lubrication and Lubricants[1]

O. L. MAAG, Lubricating Engineer,
The Timken Roller Bearing Company

LUBRICANTS for industrial anti-friction bearing applications include the following types: lime soap, soda soap, aluminum stearate, lead base, and mixed base greases, together with oils of various degrees of refinement ranging from the light bodied non-viscous oils to the heavy cylinder stocks. These lubricants take care of practically all types of bearings. There are, however, a number of applications which are heavily loaded or where the speeds are such that a new kind of lubricant, such as the extreme pressure type which has come to the fore during the last few years, should be used.

Different types of greases are used in applications where such lubricants are most suitable. Lime soap greases, which are usually the cheapest ones to compound, have the widest use. These products, as well as those compounded with aluminum stearate, are used in units where water conditions might be encountered. They do not, however, have as high melting points as soda soap greases, and their use is usually confined to the lower temperature operating conditions.

Many greases have the disadvantage that, with the higher operating temperatures encountered on higher speed units, there is a marked tendency for the lubricants to become thin. The centrifugal force created by the higher speed of the bearings has a tendency to throw out the oil from such lubricants. After cooling, a layer of heavy soap is found in the bottom of the bearing housings, the oil often having drained out through the bearing closures.

Soda soap greases as a rule will stand up better under high temperatures and high speed conditions than lime soap products, although it must be kept in mind that there is much in the art of compounding these lubricants to give them the desired properties in regard to stability in storage and in service. Aluminum stearate greases will usually return to their original consistency even if they are heated considerably above their melting point. This property cannot as a rule be imparted to lime or soda soap greases.

Many greases used for roll neck plain bearings are compounded from heavy black oils, soaps, and various percentages of inorganic fillers, such as graphite, lime, talc, mica, zinc oxide, etc. The inorganic fillers serve to polish the bearings, giving in a short time well run-in bearing surfaces. However, the disadvantage of these products is that they continue to wear away the bearings, with the result that replacements are usually quite high. There are numerous instances where better bearing life was obtained when extreme pressure greases free from fillers were used.

Often gears and anti-friction bearings are lubricated with the same lubricant. In this case, the mineral oil which is satisfactory for the gears is usually entirely satisfactory for the anti-friction bearings. In quite a few cases, however, in order to take care of the gear units, it has been found necessary for good operation to use an extreme pressure lubricant of approximately 90 to 150 seconds viscosity at 210 deg. Fahr.

For high speed applications such as electric motors, etc., designed for grease lubrication, best success has been had with soda soap products, etc. This type of grease does not separate at the usual operating speeds and temperatures as do the lime soap greases, resulting in better lubrication and much longer bearing life.

Industrial machinery frequently includes high speed units in which oil lubrication is desirable. Usually these units are comparatively lightly loaded. However, high speeds often bring about conditions where overheating is encountered, at least until after the bearings are well run in. In such units well refined mineral oils are usually satisfactory. A number of cases, however, have been encountered where on new installations of bearings there was apparently an overloaded condition. In such cases Timken practice has been to go to the use of an extreme pressure oil for a running-in lubricant, merely adding the extreme pressure base oil to the mineral oil. Usually the one charge of extreme pressure oil is sufficient to last the machine for the run-in period, after which straight mineral oils are entirely satisfactory.

Sight feed, constant level and wick feed oilers are ordinarily used on industrial equipment, the latter two usually being the most economical. In order to have a product that is economical for use with sight feed oilers, oils compounded with around ¼ per cent to ½ per cent of soaps are used. Such compounded oils adhere better to bearing surfaces and also feed more slowly.

For example, a circulating oil system is desirable for lubricating the dryer rolls of paper mills. Since the dryers are heated with steam under pressure, the bearings will always be quite warm, and as it is almost impossible to keep paper dust and condensed steam from getting into the bearing housings, the advantages of a circulating system are apparent. Due to the high temperatures encountered, a well refined cylinder oil, similar to SAE 70 motor oil, has proven quite satisfactory.

There are, of course, instances where it is not feasible to install a circulating oil system. In such cases a fixed level oil bath should be maintained and provision made for changing the lubricant at frequent intervals.

The Jordan engines in paper mills may advantageously be placed on the same system with the dryer rolls. Gear reduction units, and their bearings, for the drives of paper mills are usually lubricated by well refined cylinder oils, both bearings and gears being supplied with the same lubricant. In cases where these applications are heavily loaded the use of extreme pressure lubricants such as SAE 90 E. P. and SAE 110 E. P., has proven very satisfactory.

[1] An abstract of paper presented before National Association of Lubricating Grease Manufacturers, Chicago, October 16-17, 1934.

THE YANKEE MACHINE

By H. D. BANTA, Hoberg Paper and Fibre Co.

WHAT is supposed to have been the first single dryer paper machine was built in 1827, by a German named Oechelhauser, although it is believed that he appropriated the idea from a fire dryer that originated in Connecticut. A brief description of his machine may be of interest, since it is conceded that it was the forerunner of the Yankee machine.

The Oechelhauser machine had a single drying cylinder open at the ends and mounted on rollers known as grindstone bearings. These rollers were driven. A fire rack extended through the dryer shell, and a pan was suspended from the rack to catch the debris as it fell through the grate. This arrangement prevented the debris from dropping inside of the drying shell, escaping at the ends, and coming in contact with the paper. A fire was built in the rack and the dryer shell was heated as it passed over the fire. The paper was carried around this dryer and wound up on a crude reel, from which it was cut into flats.

This same type of dryer was later introduced into this country and was used by American manufacturers of tissue paper. The Germans, impressed by these tissue machines, introduced this type of machine into Germany and named it *The Yankee Machine*. In Germany the dryer was polished, a pressure roll added, and other improvements made. When this improved machine was again introduced into this country it was called *The Flying Dutchman*.

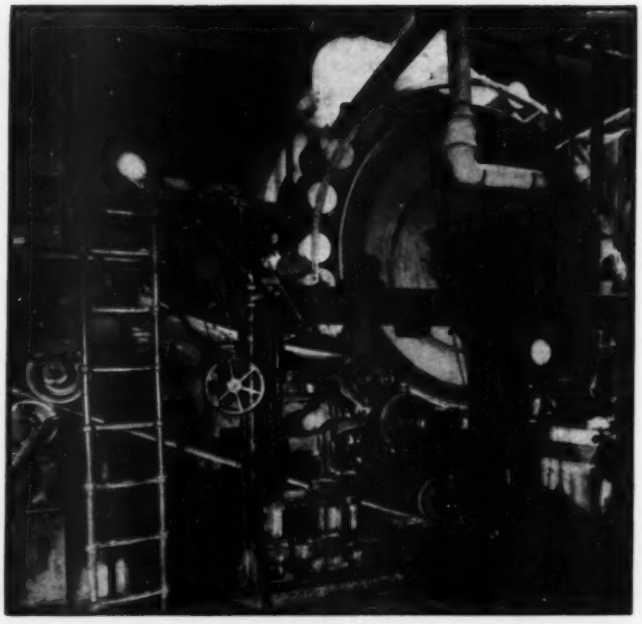
It is uncertain just when the fire dryer was replaced by the steam heated dryer. Some authorities place the time at about 1870, although in 1830 Phelps and Spafford in Connecticut constructed a complete machine with making cylinders, press rolls, steam drying cylinder, reel and cutter. There is evidence, however, that this machine was not extensively copied.

In 1870, single cylinder dryers were made by Strobel, Chernitz, Saxony and used in making straw paper.

In 1880, H. Hoebarn & Company, Henner, Westfallis, took out a German patent on an arrangement of a papermaking machine consisting of a large glazing cylinder with a pickup felt for the paper from the couch press, and a press felt from which the paper was picked up by the glazing dryer. T. J. Erkens, of Duren, protested this patent owing to the fact that he had built five machines of this same design and they were in operation before the patent was taken out. The patent was annuled in 1891.

The early Yankee machines had a dryer about five feet in diameter. In fact, one of the very early Yankee machines is still making specialties in the mill of the Erving Paper Mills, Erving, Mass.

In 1890, the Thilmany Pulp & Paper Company installed a Yankee machine with a 78 in. diameter dryer. In 1898, Beloit Iron Works built two machines for export to China. These machines were termed *new machines*. The dryers were 98 inches in diameter and were highly finished. Each machine included a pressure roll and other features which seemed adapted to the Chinese market.



A conventional Yankee machine dryer installation

The first 10 ft. diameter dryer was made in 1904. The diameter did not again increase until 1922 due to the fact that railroads would not accept them for transportation. In that year a 12 ft. diameter dryer was built and transported to the Dryden Paper Company, Canada. Around 1910, a number of Yankee machines were built 132 in. wide and each was equipped with a fourdrinier wet end, a press and a pressure roll. This type of machine is the conventional Yankee machine of today.

It might be of interest to review some of the expedients resorted to in order to increase production with this type of machine. While small after-dryers were installed as early as the 1890's, they were not common until the urge for increased production demanded that something be done. While the rate of drying per square foot of surface on a polished Yankee dryer is about four times what it is on an ordinary multiple dryer machine, it is still limited by the amount of drying surface which can be put into a single dryer.

Production on a Yankee machine was limited in the past more than at present due to the belief that it was necessary for the sheet to be wet when it was ironed onto the polished dryer by the pressure roll in order to secure high finish. Some machines which eliminated the press and carried the sheet from the couch direct to the pressure roll were built in Europe in the belief that the wetter sheet would give a higher finish. These machines were noted for low production and high steam consumption with no improvement in finish. Experience has demonstrated that a dryer sheet, especially if it is preheated, actually improves the finish.

With the exception of the installation of after-dryers, the first major attempt to increase drying capacity was the application of heated scavenging air. This air is now applied to the face of a dryer through ports in a double hood at sufficient velocity to impinge on the sheet. The hood is built concentric to the dryer so that there is more space at the top for the escape of the moisture laden air.

Experience in the application of air to the Yankee dryer has proven that drying capacity can be increased from 20 to 25 per cent by proper application of air to the dryer. R. S. Wertheimer[1] gives important data on this phase of drying.

In 1897, The Longview Fibre Co., Longview, Washington, installed a 172-inch Yankee machine with a 12-foot dryer of 177-inch face and four 48-inch after-dryers in two decks. During the last two or three years this machine has been changed considerably. A Beloit heavy duty suction press has been added and the plain bottom couch with which the machine was originally equipped has been replaced by a Beloit suction couch with a light weight top roll.

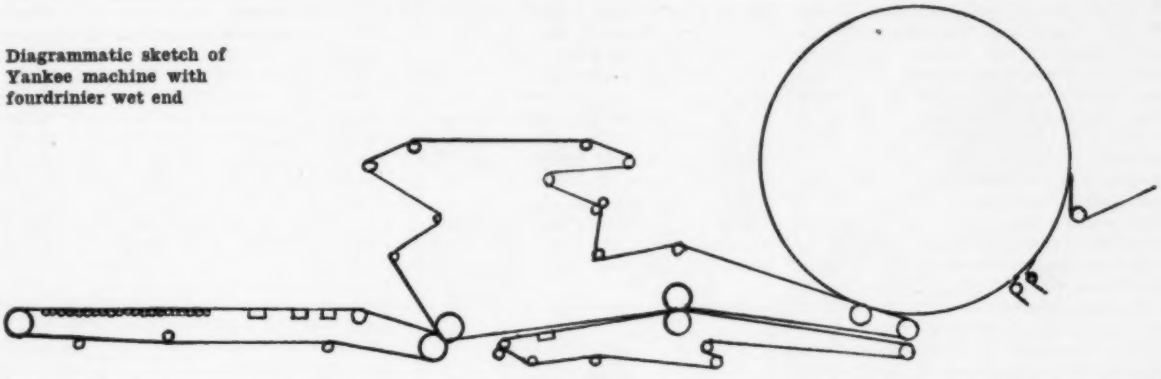
When making paper 15 pounds in weight and above, the top roll is raised

and the paper is taken from the wire in accordance with straight fourdrinier practice. The top felt is allowed to remain on the machine and operates in the usual manner on papers lighter than 15-pound basis weight. On heavier weights the suction couch works to great advantage; it produces a dryer sheet before going into the press and greatly increases production. On light weights, the pickup method seems to work out just as well as it does with either the plain or grooved bottom roll.

greatly increased the production from Yankee machines. In some cases the production has been increased as much as 25 per cent. Likewise, bottom felt life in some cases has been increased as much as four times, and on an average three times through the use of a suction press. For some kinds of paper a rubber covered suction pressure roll is also coming into use and is giving a good account of itself.

Another recent development is a high pressure Yankee dryer designed to operate with steam pressures up to 75 pounds. Naturally, with the increased dryer size and the higher steam pressure increased production will result.

Diagrammatic sketch of Yankee machine with fourdrinier wet end



Four additional 48-inch diameter dryers were added to this machine during 1933. These dryers were placed over the original 48-inch dryers thus making two banks of four dryers each being separately driven. With this arrangement, the sheet is removed from the top felt before it enters the pressure roll nip and passed around the lower bank of 48-inch dryers where it is preheated. Then the sheet is passed through the pressure roll and around the big dryer after which it is passed through the upper bank of 48-inch dryers. It has been found that preheating the sheet, that is, heating it before entering the pressure roll, makes it possible to secure a better finish than is possible with a wetter sheet going to the dryer cold as it comes from the press.

Another new development is the addition of a second pressure roll. The first attempts to use two pressure rolls, neither of them being driven, was unsuccessful. The felt bagged between the two rolls thereby ruining it and incidentally spoiling the sheet. The same trouble was experienced when attempts were made to install a second main press in order to bring a dryer sheet to the pressure roll. The felt would bag between the presses due to draw, wrinkle the sheet and spoil it. When the second press was speeded up sufficiently to eliminate the bag, the added strain pulled the felt apart.

The use of helper drives on the pressure rolls and the mounting of these rolls in anti-friction bearings has apparently overcome the trouble of the earlier days in trying to operate two of them. At the same time, the use of two pressure rolls has made it possible to materially better the finish.

The recent use of suction presses, especially rubber covered presses, has

There are certain operating difficulties common to Yankee machines which are not common to other types. Some of the most important ones are:

Wet spotting—holes made in the sheet due to dirty top felt. The remedy is to clean the top felt. If it is too bad to be done while the machine is running, it must be shut down and thoroughly cleaned or replaced.

Pick up marks—some of the fibres follow the top felt instead of adhering to the dryer. The remedy is to clean the top felt. Sometimes it is necessary to brush out the spots.

Blow marks—sheet does not want to pick up on new pickup felt. In this case the top couch should be raised slightly or more water should be carried on the felt.

The setting up of the pressure roll is also very important. It must be set up sufficiently to properly iron the sheet on to the polished dryer; if it is set up too much it tends to bag the felt. Likewise, the top couch must set back of the center of the bottom couch to get proper pick up.

One of the most troublesome conditions in operating a Yankee dryer is the adherence of the different ingredients of the paper to the dryer. If this substance is not removed at once it becomes almost as hard as porcelain and then it is removed only with difficulty.

Dirty dryers are often caused by such operating conditions as improper relation of size to alum, hardness of the water, slow stock, dirty top felt, and low pH of the stock. The pH of the stock should be around 5.6. Properly fitted doctors of suitable materials will do much in keeping a dryer clean. One very effective installation utilizes a patented steel doctor followed by a Micarta doctor to keep the dryer very highly polished. In some cases bronze doctors are preferred to steel. This whole matter is thoroughly discussed in Special Report No. 121 (Yankee Paper Machine Drier Surfaces), Technical Association of Pulp & Paper Industry, Sept. 10, 1929.

Although the Yankee differs from other types of machines in the method used in drying the sheet and in applying the sheet to the dryer, the wet end can either be of the cylinder or fourdrinier type. The converting can also be any type which is suitable to the product being manufactured.

In the early days the product of Yankee machines was confined to the different M. G. sheet and the first operation of making crepes. However, in recent years the field has broadened so that a special study would be necessary in order to determine all of the different products made on the Yankee.

1—R. S. Wertheimer, Drying Paper on Yankee Dryers, *Paper Trade Journal*, Feb. 4, 1932.

◆ ◆

◆ Harbison-Walker Acquires Goldschmidt Forsterite Patents

The Harbison-Walker Refractories Company has announced the acquisition of the American rights to the forsterite patents of Goldschmidt and his associates through an exclusive royalty granted by Doctor Victor M. Goldschmidt of Göttingen, Germany. These patents cover refractories made of olivine and of the other magnesium silicates. Included in the group are more than a dozen United States and Canadian patents.

Forsterite has a melting point of 1910 deg. C. (3490 deg. F.). It is the only magnesium silicate which will remain stable at the temperature at which many industrial furnaces operate. Forsterite has the chemical formula 2 MgO: SiO_2 and is the principal constituent of the more refractory olivines.

◆ J. N. MATTHIES, superintendent of the Tonawanda Boxboards, Inc., Tonawanda, New York, passed away at his home in Tonawanda, October 28.

Photo-electric Control of Bag Machines

By F. GULLIKSEN, Industrial Division
Westinghouse Electric & Manufacturing Company

INSTALLATIONS on various bag machines prove that photo-electric register regulators appreciatively reduce wastage, the saving depending upon the mechanical condition of the bag machine and the skill of the operator. Assuming an average wastage of 8 per cent with the machine under manual control, photo-electric register control will cut wastage to 4 per cent and usually increase production due to increased machine speed. Due to "compensated scanning" and elimination of capacitive lag in the phototube circuit, this latest method of regulation maintains its adjustment despite changes in color or finish of the paper stock or ordinary variations of line voltage, and operates with light blue or green spots on white paper up to speeds of 500 feet per minute, or with spots of darker color up to 1000 feet per minute. At a 1000 feet per minute, with a spot width of $\frac{5}{32}$ inch in the direction of travel, the duration of the light impulse is only about 1/1000 of a second.

Paper bags with a printed design on the bag, as, for example, ordinary coffee bags, are commonly manufactured by feeding printed paper into a bag machine. The problem is to control the speed of the rotary cutter to cut the paper so that the design has a definite location relative to the bottom of the bag. At paper speeds up to 100 to 150 feet per minute, manual control is fairly satisfactory, but at 400 to 500 feet per minute, there is considerable wastage due to imperfect control. By printing spots on the paper with fixed location relative to the design, photo-electric equipment is used to automatically control the register of the bags.

Photo-electric register control was first applied to bag machines operating at a comparatively low speed of 200-300 feet per minute, using a black or dark blue indicating spot printed on white paper. Immediately there was a demand for regulator equipment of wider speed range which would operate from a spot of practically any color found in standard commercial bag designs. The compensated scanner meets these requirements by using two phototubes connected in a Wheatstone bridge circuit. Due to this compensating circuit, described later, the operation of this new register regulator is not affected by variations in a-c. supply voltage within standard commercial limits.

The indication of the paper position is obtained photo-electrically from the spot printed on the paper. Each time a spot intercepts the beam of light reflected to the photocell, the illumination on the photocell decreases (provided the spot is darker than the paper) and the current through the phototube decreases. By an amplifier tube, Figure 1, this variation in phototube current is translated into a d-c. voltage impulse, which, by means of a synchronous selector geared to the cutter may be applied to the control grid of either of two grid-glow tubes. If the paper is in the correct position, the synchronous selector will be in the position shown in Figure 1 when the spot intercepts the beam of light, and since both selector circuits are open there is no control action. If the paper lags relative to the cutter, one of the synchronous selector circuits will be closed when the light beam is intercepted by the spot, and one of the grid-glow tubes energizes a motor which operates a mechanical differential connected in the driving mechanism for the feed rolls (see Figure 2). With this motor operating, the speed of the paper is increased and the paper is advanced relative to the cutter. If the paper is too far ahead of the cutter, the other grid-glow tube operates the mechanical differential in the opposite direction to decrease the paper speed and retard the paper in relation to the cutter.

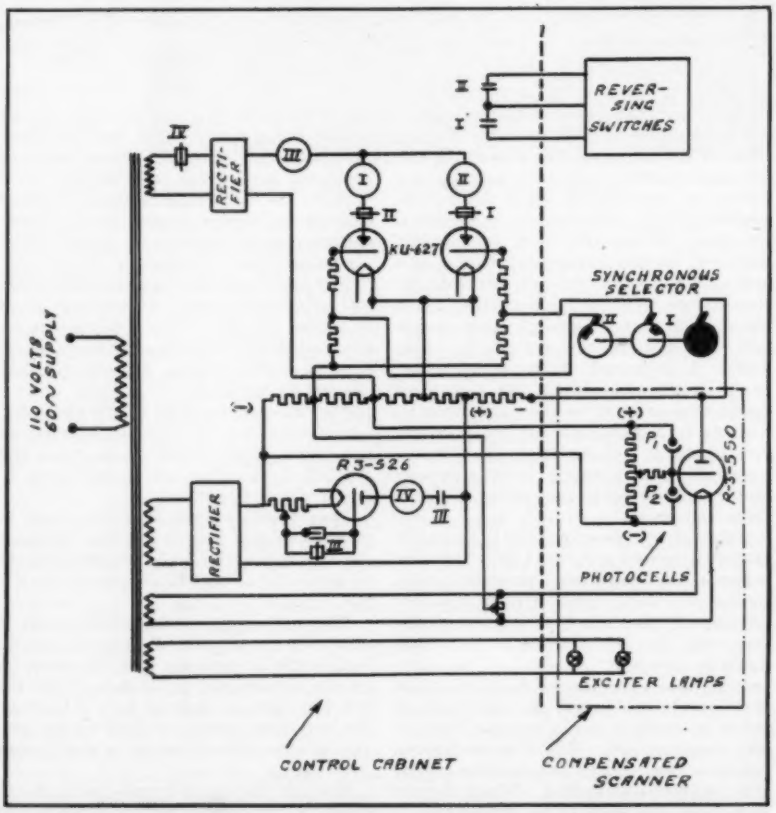


Fig. 1—Schematic diagram of the register regulator with compensated scanner. When the spot on the paper intercepts the beam of light reflected to photocell P1, the current through the RJ-550 amplifier tube will decrease, and if the synchronous selector is in a position so that the brush engages the conducting segment of disc I, the No. 1 KU-627 tube will break down and energize relays I and III. Contacts of relay I energize the auxiliary reversing switch which operates one of the motors driving the mechanical differential. "Make" contacts of relay III energize the time delay circuit consisting of relay IV, the RJ-526 tube, and associated condenser discharge circuit. After a definite time interval relay IV will be energized, and "break" contacts of relay IV will de-energize the KU-627 tube and relays I and III, and the mechanical differential operation is thus stopped

Photo-electric register regulators previously employed a scanner equipped with a single photocell. Such systems are greatly affected by fluctuations of a-c. supply voltage and by variations in the color and the finish of the paper, because the output of the amplifier tube depends entirely upon the illumination on the photocell and not upon the difference in reflecting characteristic of the plain paper and the printed spot. The compensated scanner eliminates this disadvantage by using two phototubes which simultaneously scan the paper.

The compensated scanner as shown in Figure 3 consists of two phototubes, two exciter lamps with associated optical systems, an amplifier tube and a bias-adjusting potentiometer. The scanner is connected to the control cabinet by means of an extension cable as indicated in Figure 1. If the a-c. supply voltage drops, the illumination of the paper will decrease, and if a single phototube were used, the effect would be the same as if the spot on the paper intercepted the beam of light. By using two phototubes, the illumination on each phototube will decrease by the same amount, and the phototube bridge circuit is balanced so that the output of amplifier tube remains practically constant. The same condition occurs if the color or the finish of the paper changes. Figure 2 shows the position of the spot at the instant when the register indication is obtained. In other words, the lower phototube in Figure 2 is used as the registering phototube. This phototube which corresponds to phototube P1 of Figure 1 will cause the amplifier current to decrease, if the illumination on the photocell is decreased. As the paper travels farther the spot will intercept the light beam reflected to the upper photocell shown in Figure 1, but since this will cause the amplifier tube current to increase, it is apparent that photocell P2 does not initiate any register control operation, but merely acts as a compensating phototube. Due to this compensating action, the scanner, when adjusted for one lot of bags, with, for example, white paper as base color, would remain in adjustment if the paper stock were changed to brown Kraft paper.

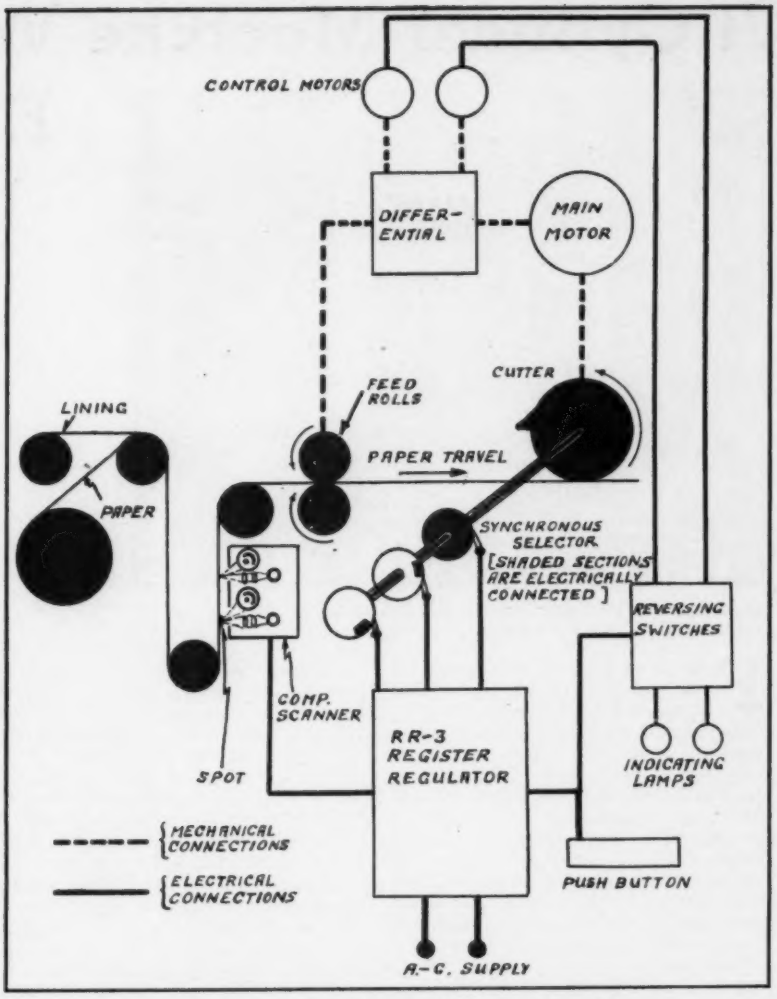


Fig. 2—Block diagram of register regulator applied to a bag machine

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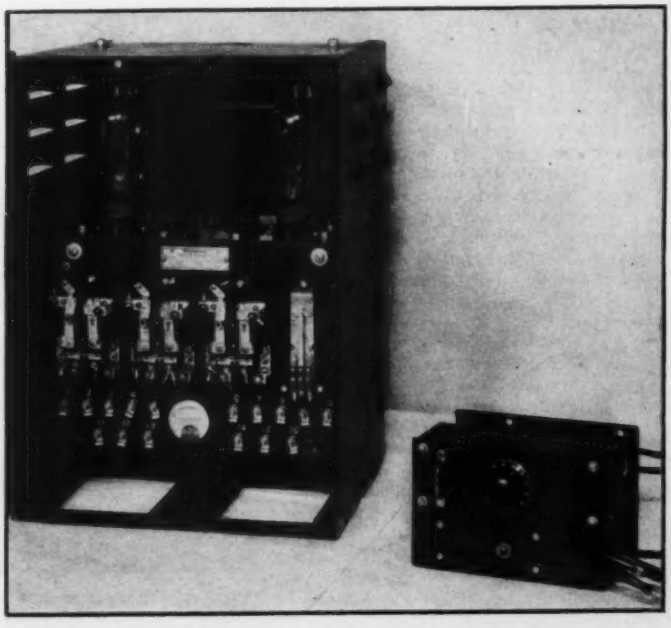

Fig. 3—Register regulator control cabinet (left) and the compensated scanner (right)

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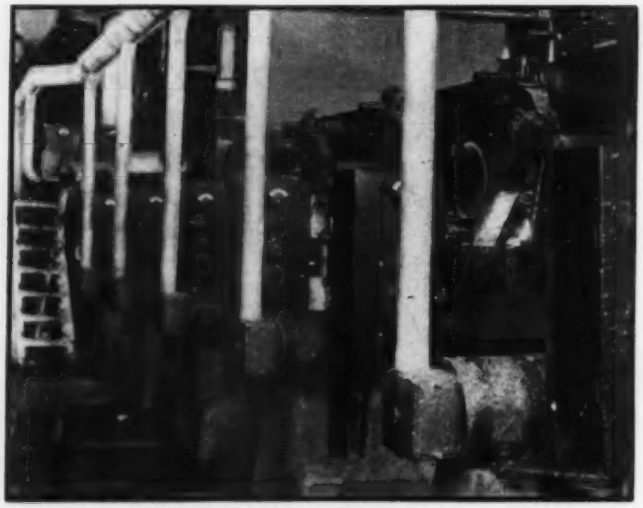
A Cylinder Machine Wet-End Electric Drive



By R. H. SMITH
Reliance Electric and Engineering Co.

Installation of gearmotors and respective control panels driving cylinder moulds

FOR many years it was considered conventional to apply power only at the first press of a cylinder machine and to transmit the power necessary to rotate the other presses, extractors, couch rolls and cylinder moulds entirely through pull in the felt. The load requirements which show up principally as frictional losses of these various rolls are known to be low, but when it is considered that the power necessary to rotate each pair of couch rolls and cylinder moulds adds to that required for each successive pair, all of which adds to the power required for the extractor rolls and the other presses, it is evident that more and more strain is imposed on the felt so that it becomes a power transmission agent, and must have a weave and texture which will transmit this power without pulling itself out of shape.

The high-quality felts which are required for manufacturing board are relatively expensive and make up a considerable part of the cost-per-ton of production, as their life is limited. With the conventional type of drive, it is common occurrence for a felt to stretch as much as nine or ten feet for every 100 feet of length as it continues in use, and it is evident that if the felt were not called upon to transmit the power for driving all of the other rolls from the first press, the stretch would not be as great, and the life of the felt would be much longer.

Furthermore, when called upon to transmit this power, the felt must have strength which means that it must be of coarse weave. Such a felt closes in when a pull is exerted on it and has a tendency to pull up the fibers. When this condition occurs, a jagged surface of the sheet actually results as can be observed when examined under a magnifying glass.

An improved drive for the wet end of a cylinder board machine has been developed wherein auxiliary motors are applied to certain rolls at various points along the felt so that the power required at those points is not transmitted by the felt from the first press. This drive was designed to reduce the felt cost per ton of board by *increasing the life of the felt* and to *improve the surface of the sheet* by permitting the use of a fine-weave felt. Such a felt will not pull up the fibers and leave a jagged surface but can only be used if not called upon to transmit power since it has less strength than a coarse felt.

Forms of Motor-Drive

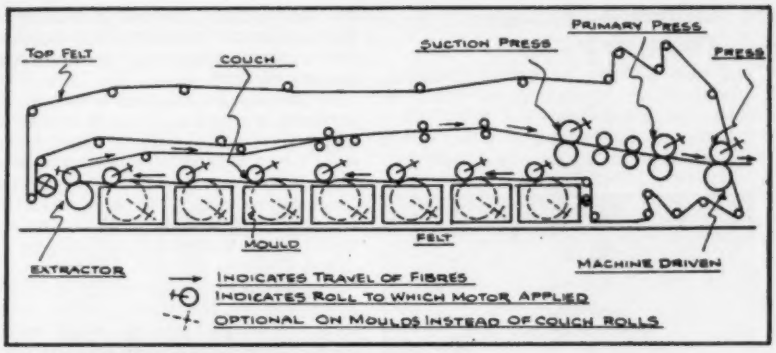
A relatively thorough arrangement of the drive is one wherein an individual motor is applied to each of the couch rolls, or cylinder moulds, an individual motor to each of the rubber-covered extractor rolls, and to the lower or upper roll of each primary press and the top roll of the first press.

Some difference of opinion exists at present among both operating men and machinery manufacturers as to whether it is better to apply motors to the cylinder moulds or to the rubber couch rolls. The ultimate solution may be the application of smaller individual gearmotors to both the cylinder moulds and the couch rolls, possibly also to both upper and lower rolls of the primary presses.

As a simpler arrangement of this drive, which is only a partial use of the improved drive, individual motors may be installed on the rubber-covered extractor rolls and the upper rolls of each section primary press, not including application to the several couch rolls.

Each individual motor is a protected type, force-ventilated direct-current gearmotor, which is so applied as to drive its respective roll through a floating shaft, with suitable flexible coupling at either end of this short intermediate shaft. The section of shaft and couplings serve as universal joints for connecting the gearmotor to its respective roll or cylinder and eliminate the neces-

View of combined exciter and booster set



Elevation sketch showing typical arrangement of cylinder machine wet end

sity of re-aligning the gearmotor on its foundation each time the roll is changed or its position shifted.

Control Panel

An individual control panel is provided for the operator which permits manual regulation of each motor, so that it will supply only sufficient power to drive the roll to which it is connected. Each individual control is arranged in a drip-proof cabinet and contains the rheostat with handle for external operation; a disconnect switch with fuses; an overload relay which extinguishes a pilot lamp in case of an overload, and also mounts an ammeter with a proper scale which serves as an indication of the amount of power being developed by the motor. The overload indication calls attention to the operator of an improper rheostat setting putting excessive strain on the felt or motor.

Speed Control

The field rheostat for each individual motor provides enough resistance to permit increasing the speed of the motor 25 per cent above whatever speed at which it would normally run by reason of the variable-voltage generator. This resistance is adjustable over several steps. The normal speed of all the motors varies in proportion to the linear speed of the paper machine because the variable-voltage generator is driven by the machine and produces an armature voltage corresponding to paper-machine speed. In operation, a slight adjustment of the individual field rheostat for any motor actually increases or decreases the proportion of the load which it takes on, namely, increases or decreases the torque it develops, instead of effecting an actual change in the motor speed.

Each motor is built with a slight compounding on the fields, giving a drooping speed regulation, or slight speed drop with increase in current. This serves two purposes. First, it makes possible the effect just mentioned whereby slight rheostat adjustment can regulate the amount of load assumed by the motor without throwing the motor out of step with the other motors; and secondly, it provides a certain amount of inherent or automatic speed regulation whereby if a change in conditions in the machine occurs, the motor automatically takes on or drops a small increment of its previous load, and remains in step instead of letting the load change cause a speed change which would throw it out of step with the other motors.

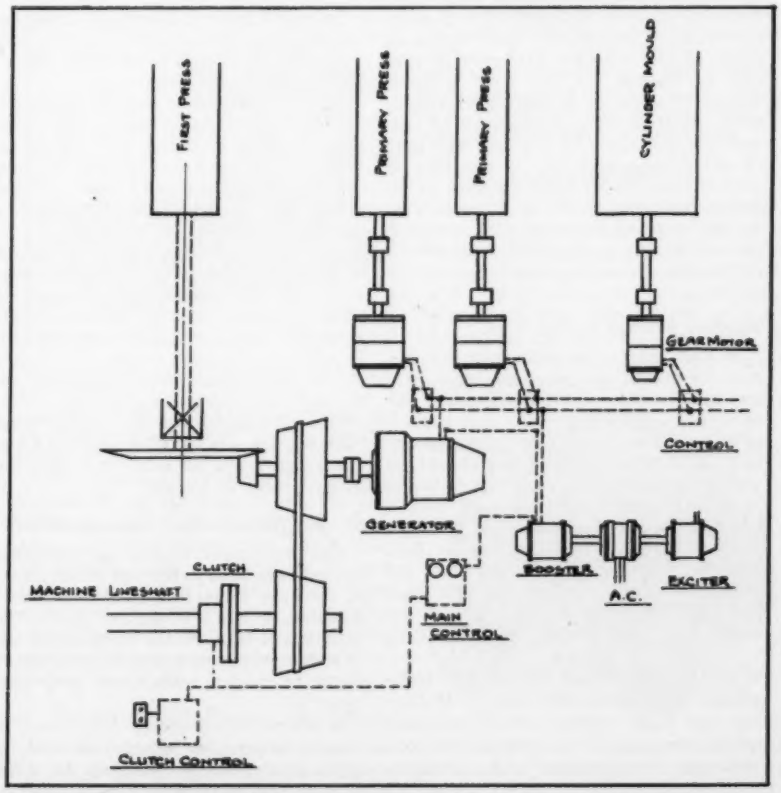
Equipment for a-c. Plants

In plants where no direct current is available, a small a-c.-d-c. exciter set is used for the purpose of supplying direct-current excitation for the generator and the motor shunt fields. As part of this same set is a small low-voltage generating unit. This unit is given an initial adjustment at time of installation and operates in conjunction with a controlling relay at the time of closing the clutch of the first press section, to apply sufficient voltage to the several individual motors so that they will just barely turn over at the instant of starting the first press.

The relay or contactor in the field circuit of the low-voltage generator is arranged to operate simultaneously with the opening and closing of the clutch in the existing drive to the first press bottom roll which is driven from the paper machine line shaft. The armature of the low-voltage generator is connected directly in series with the variable-voltage generator and, therefore, whatever voltage is developed by the low-voltage unit adds to that developed by the other generator to produce the voltage impressed on the motor armatures. When the wet end is idle the contactor is open and the low-voltage unit is without a shunt field so that its voltage is practically nil and not enough current can flow to cause movement of the rolls.

As the operator closes the clutch to start up the first press and wet end, this contactor closes instantly so that the small generator gets a normal field and its armature produces a low-voltage just sufficient to start the rolls in motion. When the operator opens the clutch to shut down the first press and wet end, this contactor opens instantly and the small generator now having no field produces a certain amount of breaking action on the individual motors, preventing any tendency to over-travel which would put strain on the felt.

The advisability of this auxiliary low-voltage generator is recognized when



Schematic diagram illustrating arrangement and interconnections of driving units

it is considered that the variable-voltage generator cannot be producing voltage to drive these motors until it has been started in rotation, and that if auxiliary means of turning over these motors were not present, there would then be an appreciable burden on the felts in that the first press would have to pull not only the several rolls of the machine, but would also have to turn over the armatures of the individual motors, driving back through the gear reductions, at the moment of starting.

In addition to the individual control stations, the only other control equipment required is a panel for the variable-voltage generator on which is mounted an ammeter showing the current developed by this generator; a voltmeter with a three-way switch in order to serve for reading the voltage developed by the generator; the exciter of the low-voltage generator; rheostats for the fields of the respective generating units and a small contactor for the field of the low-voltage generator. For individual mounting there is a starter for the a-c.-d-c. exciter unit and also a starter for the blower unit which is motor-driven and supplies the air for force-ventilating the protected-type individual motors.

The generator which is driven by the machine lineshaft or first press intake shaft may well be supplied with a combined gear unit making it a geargenerator suitable for direct connection. Preferably, it should be connected on the press side of the set of cone pulleys and belt driving the main first press so that besides changing in speed in step with the machine lineshaft, it also varies in speed in step with the first press if this belt is shifted on the cone pulleys. Where this cannot be readily arranged, however, it is fully satisfactory to connect the generator on the lineshaft side of these cone pulleys. If the belt is shifted more than a small amount, which is rare in actual practice, the generator voltage relationship can be corrected accordingly by a change in the setting of its field rheostat on the main control panel.

Possible Savings in Felt Cost

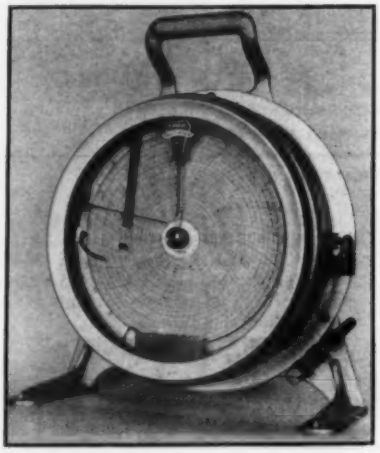
It is common to find that the felt cost for a cylinder board machine without the electrical drive for the wet end is in the vicinity of $1.40 to $1.60 per ton of paper. By the application of the improved drive, this felt cost should be reduced at least 30 to 40 per cent. When it is taken into consideration that a cylinder board machine may produce from 100 to 200 tons per 24-hour day, and operates continuously six days per week, the annual saving resulting from the improved drive should be more than double the first cost of the installation.

◆ ◆

◆ BRYANT PAPER COMPANY, Kalamazoo, Mich., announces that E. H. Larkin has been elected a vice president of the company. Mr. Larkin has been manager of the company's Chicago office for several years and will continue as divisional sales manager in charge of that office in the Daily News Building.

◆ Lightweight Portable Thermometer

A new portable recording thermometer has been announced by The Foxboro Company, Foxboro, Mass. This instrument is furnished with either self-contained or long distance type thermometers in 8 or 10-inch case sizes. The illustration shows a 10-inch, self-contained, Class II instrument with a range of —25 to +125 deg. Fahr.



A companion instrument with identically the same features may be had for recording pressures.

◆ Pipe Welding Assembly Bench

Oster-Williams of Cleveland, Ohio, has just announced the addition of a new pipe welding assembly bench to its extensive line of equipment.

This new fixture is said to be capable of handling all sizes of pipe up to 12 inches in diameter and will line up accurately and hold in position for tacking, fittings, flanges and branches at any angle. For handling longer lengths, an extension bench can be supplied.

The main bench and extension consist of an eyebeam mounted on tubular legs, with sufficient spread to eliminate tipping. Elevating and VEE supports are all steel. The main bench weighs 700 lb. and the extension 300 lb. The bench can be disassembled for portability and re-assembled quickly and easily.

The dimensions of the main bench eyebeam are 3 ft. long by 1 ft. wide, and the extension 6 ft. long by 1 ft. wide. Their height is 2 feet.

◆ Brightness and Opacity Meter

An instrument known as the reflectometer has been developed at the Henry A. Gardner Laboratory, 2201 New York Avenue, N. W., Washington, D. C. The instrument is a visual comparator and is suggested for use to measure pulp reflectance, paper reflectance, color and opacity.

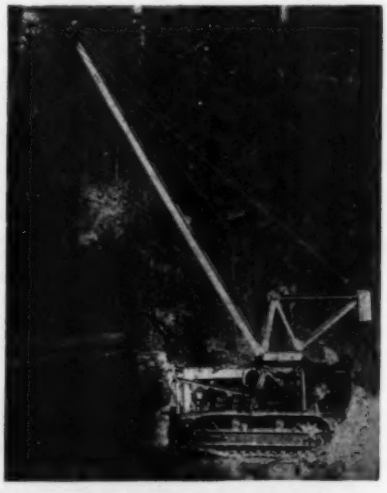
A single incandescent lamp may be moved to vary the relative amounts of light on two sample surfaces in either end of the instrument. The observer compares the reflectances of these two surfaces as they are seen side by side in the instrument. The lamp can be set very accurately to the position at which both surfaces appear to reflect the same amount of light.

In opacity determination one of the surfaces is a sheet of paper backed by black velvet, the other a sheet of the same paper backed by white magnesium oxide. The scale of the instrument reads directly the ratios of reflection from the two samples. Thus, the contrast ratio, which is the measure of opacity, is read directly.

One of the surfaces may be a pulp or paper sample, the other a white porcelain enamel standard of known reflectance. From this standard the reflectance of the pulp or paper may be determined. The plan to measure "Brightness" in the paper industry calls for a measure of the reflectance of samples in blue light. Red, green, blue and Daylite filters are supplied with the instrument. The Daylite filter is used to compare samples and make color matches. The instrument may also be used for making color comparisons, measurements of yellowness and fading, and measurements of color difference.

◆ Crane for Log Loading

Bucyrus-Erie Company, South Milwaukee, Wis., has recently announced the CT-50 Loadmaster Crane. This crane is powered with the Caterpillar 50 gasoline or Diesel engine, and is mounted on modified Caterpillar tracks. It is provided with a 30-ft. boom and swings through an arc of 240 deg. The lifting capacity is 13,900 lb. at 12 ft. radius.

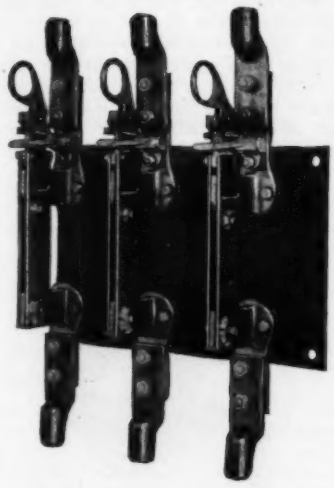


The particular advantage of this crane for log loading is its ability to travel easily and quickly over uneven ground and by means of patented Bucyrus-Erie hydraulic stabilizers to adjust itself for loading.

◆ Disconnecting Switches with Silver to Silver Line-Pressure Contacts

A new line of indoor disconnecting switches, with ratings as high as 1,200 amperes at 5,000 volts, featuring silver-to-silver line-pressure contacts, has been

announced by General Electric's Switchgear Sales Division, Philadelphia, Pa. The silver, applied to the contacts by a special G-E process which produces a surface of unusual wearing qualities, is stated to eliminate troublesome oxidation and its inherent disadvantages.



The complete line includes hook-operated, single- and double-throw, double-throw double-blade transfer switches with half- or full-capacity blades, single-throw tandem transfer switches with full-capacity blades, and group-operated switches controlled manually or electrically. The single- or multi-pole switches are mounted on compound insulators and metal bases. The insulators are made of non-inflammable, arc-resisting material and have a dry flashover of 25 KV.

◆ Bronze Gate Valve

The Kennedy Valve Manufacturing Co., Elmira, New York, has placed on the market a new heavy standard bronze gate valve designed for 150 lb. working steam pressure and 250 lb. working water, oil or gas pressure. This valve,

known as Figure 23, has all the special features of design which were recently incorporated in the Kennedy Figure 27 standard bronze gate valve but is heavier throughout to withstand the higher working pressures for which it is intended. These valves are built in a complete range of sizes up to 3 inches.

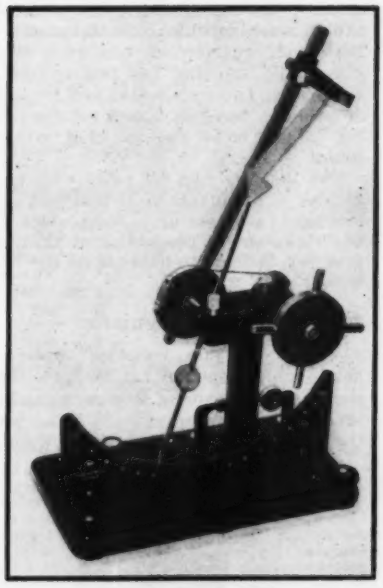
◆ Paper Stiffness Tester

An instrument to measure the stiffness, softness, pliability, or feel of various kinds of paper, developed in the laboratory of one of the largest paper manufacturers, is being manufactured and distributed by W. & L. E. Gurley, Troy, N. Y. In using the instrument the stiffness of the paper is measured by clamping a prepared sample in a movable arm, and dragging the paper over the top of a weighted pointer, until the bending of the paper releases the pointer. The amount of deflection of the pointer, read on a scale at the bottom end, is the measure of stiffness.

The clamp holding the sample can be raised or lowered on the arm, permitting the use of samples from 1-inch to 4½-inch lengths. The width may be from ½ inch to 2 inches.

The pointer can be loaded with weights of 5 grams, 25 grams, or 50 grams, placed at any one of three distances below the center.

The clamp arm is rotated by a wire belt running from a capstan handle,



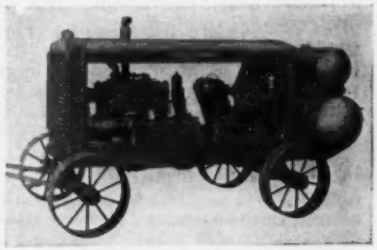
which is turned by the person conducting the test.

A double sine scale is mounted on the base. Leveling screws and a circular spirit level are provided.

The instrument, designated as the Gurley R. D. Stiffness Tester, is constructed accurately from bronze, aluminum, and stainless steel, finished in black, with chromium-plated small parts. Its weights are adjusted to fine tolerance; the pivot bearing for the pointer arm is jeweled; and the locating holes for the weights and the paper clamp are precisely spaced.

◆ Portable Two-Stage Compressor

In response to a demand for a portable air compressor that would have a greater capacity and a lower fuel consumption for its size and weight, the Sullivan Machinery Company, Chicago, Ill., has brought out its Type WK60 unit. This new compressor, now available in four sizes, is a two-stage design of the angle or "V" type with the air end air cooled. This design together with a new wafer valve of exceedingly large port area and very low lift is said to reduce fuel consumption.



The base of the compressor is of welded structural steel; ball bearings are used for the main bearings; and either two or four steel or rubber tired wheels may be used for mounting or a unit may be mounted on a truck.

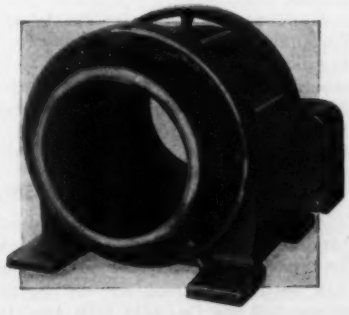
◆ Rubber-Tired Industrial Wheels

A complete line of rubber tired industrial wheels, specially designed to replace obsolete steel wheels on equipment already in service is announced by The B. F. Goodrich Company, Akron, Ohio. Known as Goodrich "Vulc-On" the line is now available in a wide assortment of sizes and types to meet practically every operating condition.

Advantages cited by the manufacturer for these wheels are: Reduces wear and tear on floors; easy rolling; lower depreciation on equipment; less noise and confusion where they are used; reduced breakage claims; fewer delays and tie-ups and increased handling speed.

◆ Coil Protected Motors

A new line of squirrel-cage motors of open type construction and in which Bakelite shields are sealed over the stator coils has been introduced by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis. The shields give protection against metallic dust, grit, oil, moisture, mild acids and other agents injurious to insulation.

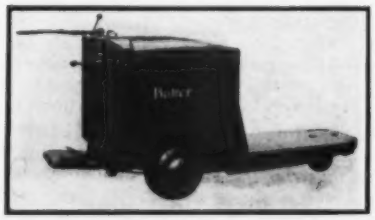


These motors, designated as "Seal-Clad," have cast-steel frames, silver-brazed rotors, and oil and dust-tight sleeve or anti-friction bearings; and are built in ratings up to 25 hp.

◆ New 3-Ton Elevating Truck

The Baker Industrial Truck Division of the Baker-Raulang Company, Cleveland, has just brought out a new two-wheel drive, four-wheel steer, 3-ton elevating truck. The most obvious change from previous models is the "streamlined" enclosure for the battery box and controls. Other less obvious new features include an electrically welded frame of high carbon steel, alloy steel trailing axle of great strength, larger travel brake than on previous models, roller bearings at top and bottom of steering mast and needle bearings in many of the steering rod connections for increased ease of steering, somewhat higher travel speeds, and a sponge rubber pad on the operator's platform which decreases fatigue under long hours of continuous operation.

The power axle and the lift unit are the same units which have been used on Baker trucks for several years. The travel controller is mounted in the power compartment enclosure at the operator's end and is interlocked with the foot brake through a magnetic blow-out mill-type contactor in such a way that the circuit is opened when the brake is applied and can only be closed by returning the controller to neutral and releasing the brake. Three speeds forward and reverse are supplied and foot control in first speed in both directions may be had as optional equipment.



All bearings are fitted with high-pressure greasing nipples located in such positions that they can be reached very easily with the grease gun which is furnished with the truck. A heavy, hinged plate at the battery box end of the platform keeps the load in place and guards against injury of the truck by a shifting load or by running under an odd-sized skid.

Standard platforms are furnished in lengths from 55 to 84 inches and can be furnished as special equipment in any length desired. Standard platform height is 11" giving ample clearance under the standard 12" skid and the lift is 5⅝".

◆ Oil and Grease Seal for Shafts

A new oil and grease seal, known as type BB and designed for application to all types of machinery embodying shafts, has been announced by the National Motor Bearing Co., 1218 78th Ave., Oakland, Cal.

The actual sealing member contacting the moving shaft is made of various materials, usually a processed leather, to suit different conditions such as temperature, peripheral speeds, unbalanced pressures and chemical activity. A new type of leather known as Saetan is the most popular material used.

An outer steel case, which locks the seal assembly permanently has a press-fit accuracy of .002" tolerance, plus or minus on the diameter; and an equalizing annular garter spring within the case provides a uniform continuous contact, pressing against the sealing member at all points circumferentially.

◆ Embossed Napkin Machine

Paper Converting Machine Company, Green Bay, Wis., manufacturer of napkin folders and paper converting machinery, has announced a new cocktail napkin machine which will manufacture 10x10-inch quarterfold embossed napkins. The machine has two one-color die inkers; two embossers; two two-color printers, being equipped for die inking in one color and printing in two colors.

The machine can be built with any number of die inkers up to four and any number of printers up to four colors. It has a guaranteed production of 325 napkins per web or 650 napkins on the two webs.

◆ Ball Bearing Regulator

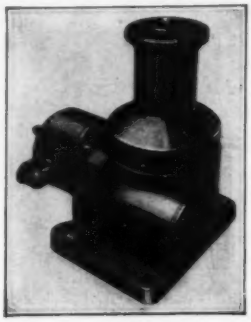
A new pressure reducing regulator has been developed by the Mason-Neilan Regulator Company of Boston, manufacturers of automatic regulating and control equipment. This regulator, known

as the No. 505 Series, is equipped with non-corrosive stainless steel ball bearings which roll up and down with the valve stem travel and reduce friction to a minimum. Ball bearings also turn freely under the spring adjusting screw and permit pressure settings to be easily accomplished.

Other features of the design are said to practically eliminate wire drawing and cutting of the valve plug and valve seat rings. Grease sealed stuffing boxes can be furnished for those services where it is desirable.

◆ Motorized Car Spotter

The Link-Belt Company, Chicago, has announced that its vertical-capstan electric car spotter will hereafter be furnished with motor attached to side of spotter housing. The motor shaft extends into the housing which contains all gears, a helical-gear reduction at motor and a worm-gear set.



Like its predecessor, this spotter is furnished in two sizes. The smaller machine has a rope pull of 5,000 pounds, while the larger size has a pull of 10,000 pounds.

◆ Dennett Made Chairman of Code Authority

Phillips Dennett, of the Bird Machine Company, South Walpole, Massachusetts, was elected Chairman of the Permanent Code Authority of the Pulp and Paper Machinery Industry which is a division of the Machinery and Allied Products Industry, at a meeting held at the Commodore Hotel on Wednesday, October 10th.

In addition to Mr. Dennett, the other members of the Code Authority are: Stanley G. Bevis, Bevis Machine Company, Middletown, Ohio; A. B. Clark, J. O. Ross Eng. Corp., New York City; J. E. Waterhouse, Montague Machine Company; Turners Falls, Massachusetts; and W. B. Wilshusen, Cameron Machine Company, 61 Poplar Street, Brooklyn, N. Y.

In addition to the executives of machinery companies, the meeting was attended by: G. A. Barber, Assistant Deputy Administrator, Francis E. Lee and F. A. Davidson, Administration Members, all representing the NRA. Alexander Konkle, the representative of the Machinery and Allied Products Industry, which is an organization representing a large group of machinery associations, was also present.

A meeting of the newly elected Permanent Code Authority was held immediately after the election of this Authority by the employers representing machinery companies in this industry and a Trade Practice Plan was adopted in conformity with the code for this industry which was approved by the NRA on August 11th.

◆ Malvin C. Burrell

Malvin C. Burrell, vice president and general manager of the Orr Felt and Blanket Co., Piqua, Ohio, passed away at his home in Piqua October 10 after a protracted illness.

Mr. Burrell had been associated with the Orr Felt and Blanket Company and its predecessor, The F. Gray Company, for about forty years, practically his entire business life. He formerly had been a salesman for the felt and blanket manufacturing firm while living at Utica, New York, his former home. He became vice president and general manager of the Orr company shortly after moving to Piqua in 1923.

As head of the Orr company, Mr. Burrell was well known in the paper industry and was active in industrial and local civic enterprises.

Surviving Mr. Burrell are his widow and one brother.

◆ Mathieson Southern Plant Near Completion

The new $7,000,000 plant of the Mathieson Alkali Works at Lake Charles, La., will begin operations early in December. According to officials of the Mathieson Alkali Works, construction work at the new plant is being maintained considerably ahead of schedule, despite the fact that it involves a number of engineering developments embodied in such a plant for the first time.

The Lake Charles plant, it was pointed out, will provide a new source of supply for soda ash, caustic soda and related heavy chemical products over a wide area in the South and Southwest. It will also permit the economical shipment of alkali by water to points on the Atlantic and Pacific seaboards, along the Gulf Coast, and on inland waterways including the Mississippi.

◆ DR. TH. BENTZEN, retired chemist of the Whiting-Plover Paper Co., Stevens Point, Wis., recently left for a year's vacation in Denmark. Greetings from Dr. Bentzen to THE PAPER INDUSTRY indicate his safe arrival.

◆ Johnson Resigns as Head of American Hoist & Derrick

The American Hoist & Derrick Company of St. Paul, Minnesota, announces the resignation of Frank J. Johnson as president. Mr. Johnson, with Oliver Crosby, founded the American Manufacturing Company in 1882, manufacturing hand power hoists and derrick equipment, in 1892 reorganizing as the American Hoist & Derrick Co., enlarging their manufacturing facilities and consequently producing a complete line of hoisting and earth moving machinery.

Frederic Crosby, son of Mr. Oliver Crosby, succeeds Mr. Johnson. Howard S. Johnson, son of Frank J. Johnson, retains his title as vice president, and Harold O. Washburn, formerly general superintendent, has been appointed vice president and treasurer to succeed Mr. Crosby.

◆ New Catalogues and Publications

John W. Bolton & Sons, Inc., Lawrence, Mass.—This company has issued a new bulletin covering all types of Jordan plugs. The interior 2-page spread is a comparative product sheet, in which red, yellow and green lights are used to show what they claim to be a fair comparison of the advantages and disadvantages of various types of Jordan plugs. Space is left on the right hand side of the product sheet for the paper man to make his own scoring of the Bolton Wedgeless plug against the plug currently installed in his Jordans. Copies of this chart may be obtained by writing Bolton & Sons and asking for "What's the Score with a Wedgeless?"

Esterline-Angus Co., Indianapolis, Ind.—A Bulletin, No. 834 contains a brief description of the pressure recording instruments manufactured by this company. The bulletin is well illustrated.

Falk Corporation, Milwaukee, Wis.—A new Motoreducer Bulletin has just been published which includes the company's complete line of motoreducers including 2-Speed Motoreducer data. Some of the data already published has been amplified and revised. Table of Service Factors has been altered and some entirely new and interesting installation and application pictures are shown. The catalogue is well laid out and printed in two colors, with a large number of illustrations.

General Electric Co., Schenectady, New York—"Industrial Cable," a new publication by this company describes and lists all standard types of insulated wire and cable used by industrials for transmission, distribution and control, and used on or with electric equipment such as mining machinery, locomotives, arc welders, neon signs, etc.

B. F. Goodrich Co., Akron, Ohio—A four-page booklet has just been issued covering the company's newly introduced line of Vulc-On rubber tired wheels for industrial trucks. The advantages of these wheels as compared to steel wheels on equipment already in service are pointed out and there are data concerning comparative tests between rubber tired and steel wheels.

Harnischfeger Corp., Milwaukee, Wis.—To celebrate its golden anniversary, this company has just published an attractive book entitled "The Fiftieth Year." The book contains 84 pages and is bound in gold and purple. It has as its background, the American business drama of a small beginning . . . of early struggles and the evolution of industrial equipment responsible for America's rise to world commercial power. The book is profusely illustrated. Copies are being presented to the company's friends and patrons, and executives desiring one should make their request on company letterhead to the Harnischfeger office.

Louis Allis Co., Milwaukee, Wis—A new bulletin describes and illustrates the various types of shaftless motors, their construction and electrical characteristics. It also contains valuable tables and other engineering data of interest to every manufacturer and user of motorized production machinery. Copies on request.

Lowe Paper Co., Ridgefield, N. J.—This company has prepared a new Ridelgo Color Selector to give the users of cartons and colored boards a guide by which they may select attractive color combinations. The samples are bound separately in three layers to a page. The spiral binding permits the combination of most any of the samples for consideration.

Norton Company, Worcester, Mass.—This company has just released an interesting booklet devoted to "Norbide" which is the registered trade name for Boron Carbide, a new material developed and patented by this company. It is claimed that Norbide is the hardest material ever produced for commercial use, exceeded only by the diamond. In this booklet, the physical properties, manufacture and uses of Norbide are explained in a concise and comprehensive manner. The booklet is illustrated.

Policyholders Service Bureau, One Madison Ave., New York City—The Bureau has recently completed a survey of the accounting policies of 34 prominent companies with reference to inter-company sales and transfers, and has published its findings in a report entitled "Accounting Policies in Inter-Company Sales and Transfers." Copies will be sent on request.

Propellair, Inc., Springfield, Ohio—An attractive new broadside illustrates a number of applications in industrial plants for Propellair fans. Among these, is shown a fan operating in the machine room of a New England paper mill. Copies on request.

Roots-Connersville Blower Corp., Connersville, Ind.—Bulletin 50 B11 is devoted to the new high duty Connersville vacuum pumps. Many improvements are claimed by the manufacturer, including accessible roller bearings, improved lubrication, gears and bearings fully protected, herringbone gears, and elimination of stuffing box attention. In addition to the pumps, other items of paper mill equipment are listed, including a combination flat box unit, a barometric leg, black liquor filter pumps, and blowers.

Shafer Bearing Corp., 6501 W. Grand Ave., Chicago—This company's catalogue Number 12 covering Shafer roller bearings and self-aligning units has been received. This catalogue contains 49 pages and contains rather complete information on the design and application of Shafer bearings. There are specification tables, price lists and recommendations, also a number of illustrations of typical applications including paper mill uses.

Sound Engineering Corp., 412 N. Leavitt St., Chicago—A 12-page bulletin illustrates and describes devices and apparatus used for insulation testing. Such subjects as Insulation, Dielectric Strength, Resistivity and Dielectric Constant and Power Factor are discussed. Many technical men will be interested in securing a copy of this bulletin for their libraries.

BOOKS

Air Conditioning Data—This Bulletin No. 27 of the Kansas City Testing Laboratory, 700 Baltimore Ave., Kansas City, Mo., presents certain properties of moist and dry air in an unusual and condensed form. No attempt has been made to cover the field of air conditioning. It is believed, however, that the tables and charts in this bulletin will prove useful to those interested in problems of drying and air conditioning. The price is 25 cents.

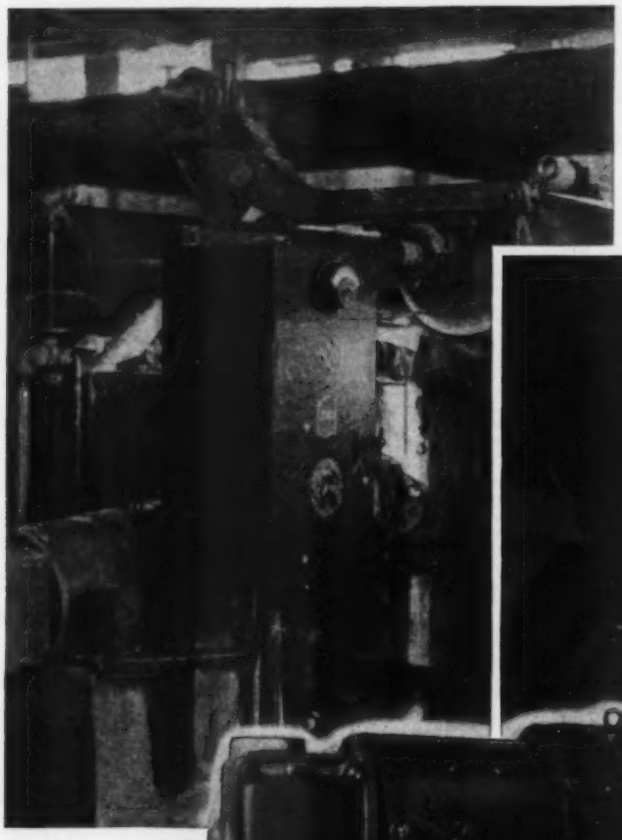
Practical Everyday Chemistry—This volume by H. Bennett of over 300 pages (5½ x 8¼") is a book of formulae, simply written, that tells how to make adhesives, alloys, bleaches, carbon paper, cement, colors, disinfectants, fireproofing, inks, paints, soaps and cleaners, and hundreds of other useful articles. It contains an entire chapter on the subject of paper. In this chapter are presented formulae for the water-proofing, parchmentizing, coating, and oil and greaseproofing of paper as well as other data.

The book, priced at $2.00 per copy, is published by The Chemical Publishing Company of New York, 175 Fifth Ave., New York City.

Preservation of Newspaper Records—This bulletin issued by the National Bureau of Standards, Miscellaneous Publication No. 145 may be had from the Superintendent of Documents at Washington, for 5 cents in stamps. B. W. Scribner is the author. The contents of the bulletin are divided into six chapters: Introduction, Examination of old newspapers, Protective measures, Reproduction of newspapers, Newsprint for permanent editions and Recommendations.

Reliance Electric Drive for Wet-end of Cylinder Board Machine

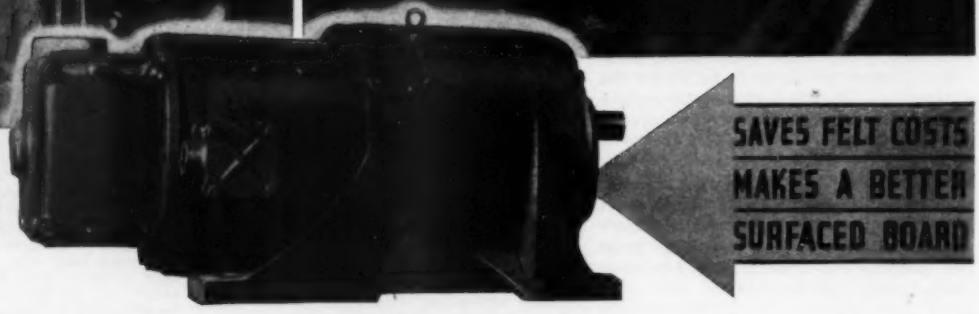
(Below) Control panel and gearmotor driving cylinder mould on Rice, Barton & Fales Paper Machine



This improved drive increases the life of felts by applying power directly where needed, by providing a visual indication of the correct tension and by maintaining this tension automatically.

(Below) Gearmotors in foreground drive primary press rolls.

Reliance Gearmotor, water-tight and force-ventilated



The Reliance Drive takes from felts the job of transmitting power. It applies power right at the point it is needed. Felts can therefore be selected, which will do best the work for which they are primarily intended — convey fibres and remove water. Board is produced with a better surface.

Individual Reliance GearMotors, water-tight and force-ventilated, are applied to each cylinder mould (or couch roll,) extractor roll and press roll. The motors and control are designed to meet all operating conditions automatically with slight adjustments when changing weight of board.

These drives are available for both alternating and direct-current circuits. Send for a Reliance man to show you a complete layout.

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POWER

GENERATION + UTILIZATION + MAINTENANCE

This section turns the searchlight on power and its allied problems, showing big possibilities to save. Opportunities to improve conditions, methods, apparatus will be discovered. Worth while practices suggest new ideas and wider usages of equipment.

By W. S. JOULE

◆ Lubrication of Motor Bearings

An analysis of electric motor failures shows that a substantial percentage are caused by bearing troubles and that these failures are caused more by over lubrication than the lack of lubrication.

Experience has shown that either the anti-friction type of bearing or the sleeve type will give satisfactory life and service if the lubrication job is properly handled. While anti-friction bearings will stand up under lack of lubrication somewhat better than sleeve bearings, both types show the effects of improper lubrication whether caused by poor quality of lubricants or over-lubrication.

The sleeve bearing oil wells of most motors are liberal in size and equipped with sight and level gauges to make inspection and filling easy. It is, however, not practical to provide an overflow with a large outlet hole and still keep it reasonably tight against the entrance of dust and dirt. It therefore follows that when oil is poured in, at the top of the well, in a large stream, the inside level will be above that shown by the overflow gauge. Another point which does not occur to most oilers is that when oil is poured in at the top, the bearing, shaft and housing surfaces are covered with oil which, when it all drains off, will increase the oil level.

Oil should never be poured into a bearing housing while the motor is running unless it is impractical to shut the motor down. Due to the action of the oil ring, which dips into the well below the bearing and carries oil to the top of the shaft, the surface of oil in the well is not level, while the motor is running. It therefore follows that the gauges show a false level. It should also be remembered that when the motor is running, the oil grooves are full and all of the surfaces are coated with oil which drains back and raises the level when the motor stops. Therefore, if oil is poured in while the motor is running, the pouring should be stopped before the gauge shows that the well is full.

Overfilling of sleeve bearings results in saturated windings which destroys insulation and in the case of direct current machines also causes commutator troubles. In the case of anti-friction bearings over lubrication caused a somewhat different series of motor difficulties. As a rule anti-friction bearings that are greased too liberally run hot, and eventually become noisy. The excess heat, caused by the churning grease, increases the expansion and it is the expansion that tends to destroy the bearing.

In the case of both sleeve and anti-friction bearings it pays to use lubricants of good quality. Some organizations attempt to use lubricants that are just one step above kerosene. Others use oils so stiff they will hardly flow and in many cases greases are being used in anti-friction bearing motors that are too heavy or that contain acid or alkali hardeners.

◆ EFFICIENCY IS impossible with apparatus that has been allowed to become inefficient. If you would keep the plant in a good state of physical repair, make somebody personally responsible for every bit of apparatus and hold him to strict accountability. Every time a boiler is shut down, it should be inspected. Do not take it for granted that there is no scale because you have always, in the past, found no signs of scale. Look and see. Make sure that there are no accumulations of soot and ash anywhere upon the heating surfaces, and do not, under any circumstances, neglect to inspect the boiler baffles. In some plants one man is charged with the duty of making a *daily* inspection of the boiler and furnace settings and he is held responsible for air leaks. Occasional inspections are not sufficient to insure efficiency.

◆ A LEAK in a steam line of ¼ inch diameter will waste 4400 pounds of steam in 24 hours with steam at 100 pounds pressure.

◆ Repairing Air Leaks in a Boiler Setting

One should assume that every crack in the boiler setting is conducting air to the heating surface, and check over each one with a candle while the draft is on furnace. Be sure to try the candle around eye-beams or stays, tube blowing openings and door frames, also along the side of the drum at the top of the setting. These points are seldom airtight for any length of time, owing to the expansion and contraction of the boiler and setting, and require frequent attention. Another method of detecting air leaks is to keep the setting whitewashed and the leaks will be readily seen by the accumulation of dust around the opening. Another method, and one that is frequently used, is to close the damper in the breeching suddenly just after freshly charging the fire with coal. Smoke will then issue from all cracks or openings that are detrimental to the operation of the boiler.

Lime or cement mortar should not be used for repairing leaks of this kind, as it has practically no elasticity and, after drying, it usually falls out. A satisfactory filler is made from cotton waste and fire clay, spreading the waste so it will be well covered with clay. Use a sharpened piece of wood to calk this tightly in the cracks. Old magnesia pipe covering made into a paste makes a good filler, as does asbestos rope and cement. Likewise, there are cements on the market for this purpose.

◆ Consider Maintenance Cost in Selecting Grates

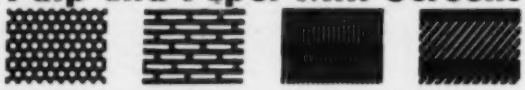
In Europe steel and wrought iron are used extensively for grate bars while cast-iron finds little competition in this country, because of its relative lower initial cost. As the capacity of units increases and the necessity of keeping a machine in service becomes of more and more importance, however, the indications are that steel and wrought-iron will find increasing favor. The first cost of steel and wrought-iron are higher than for cast-iron, of course. But the lower expense for maintenance is much less. When a steel or wrought-iron bar warps or breaks, it can be straightened or repaired by heating, welding or forging at a low unit cost whereas bars of cast-iron must be scrapped. Another advantage of steel and wrought-iron is that they afford a smoother surface to the fire bed, which makes for easier barring and removal of clinkers.

Economy of grates is not to be found in their first cost but in the cost of maintenance. It has been claimed that the addition of nickel very materially increases grate life, as does also galvanizing the bars with zinc. It is short-sighted policy to buy grates solely on the basis of cost per pound.

◆ Handling of Ash in Coal Is Costly

The handling of the worthless ash through the various steps in the distribution and utilization of coal is a large item in the cost of energy delivered at the power plant. The principal cost factors increased by handling of excessive ash are: Freight; unloading and delivery cost; storage; conveying and firing; grate and furnace capacity, and ash disposal. For example, 1 per cent of excess ash in a 50-ton car of coal amounts to 1,000 pounds of worthless material per car and entails a loss in transportation cost of $1 per car where the freight rate is $2 per ton.

Pulp and Paper Mill Screens



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WANTED—Development Engineer for Engineering Department of Book Paper Mill to prepare and direct designs for plant equipment and process improvements. Man of good fundamental mechanical training, at least 10 years' experience, and under 45 years of age preferred. Supply full record of education, experience and personal information in first letter. Address Box 222, THE PAPER INDUSTRY.

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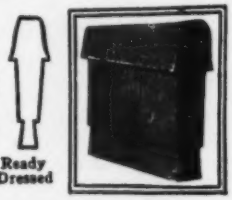

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The Paper Industry Safety Contest

July 1, 1934 to June 30, 1935
Three Months Cumulative Scores
(As of September 30, 1934)
32 Mills Report Perfect Score

PERFECT SCORES

Division I—Paper and Pulp Mills

	PARTICIPANT	MILL	LOCATION
GROUP A	Bryant Paper Co.	Kalamazoo	Michigan
	Bird & Son, Inc.	East Walpole	Massachusetts
GROUP B	Kimberly-Clark Corp.	Niagara	Wisconsin
	Consolidated Paper Corp., Ltd.	Port Alfred	Quebec, Can.
	St. Croix Paper Co.	Woodland	Maine
GROUP C	Nekoosa Edwards Paper Co.	Port Edwards	Wisconsin
	Escanaba Paper Co.	Escanaba	Michigan
	Oxford-Miami Paper Co.	West Carrollton	Ohio
	Blandin Paper Co.	Grand Rapids	Minnesota
	Crystal Tissue Co.	Middletown	Ohio
	Strathmore Paper Co.	Woronoco	West Springfield, Mass.
GROUP D	Sylva Paperboard Co.	Sylva	North Carolina
	Bergstrom Paper Co.	Neenah	Wisconsin
	Kimberly-Clark Corp.	Lakeview	Neenah, Wis.
	International Paper Co.	Webster	Orono, Maine
	Hollingsworth & Whitney Co.	Arcostock & Cobassee	Gardiner, Maine
	Bird & Son, Inc.	Phillipsdale	Rhode Island
	International Paper Co.	Livermore	Chisholm, Maine
	U. S. Envelope Co.	Worcester	Massachusetts
	Spaulding Fibre Co., Inc.	New Mill	Milton, N. H.
	International Paper Co.	Riley	Maine
	U. S. Gypsum Co.	Gypsum	Ohio
	U. S. Gypsum Co.	Genoa	Ohio
	Spaulding Fibre Co., Inc.	Hayes	No. Rochester, N. H.
	Mead Paperboard Co.	Rockport	Indiana

Division II—Remanufacturing

Container Corp. of America	35th Street	Chicago
Continental Paper & Bag Corp.	Elisabeth	New Jersey
Bird & Son, Inc.	Roofing	Chicago
Container Corp. of America	Natick	Massachusetts
Texas Corrugated Box Co.	Dallas	Texas
Southern Container Co.	Houston	Texas
Bemis Bros. Bag Co.	East Pepperell	Massachusetts

IMPERFECT SCORES

	Key No.	Rank	Disabling Injuries	Frequency Rate
GROUP A	P-108	3	2	3.893
	P-13	4	2	4.497
	P-27	5	4	5.420
	P-12	6	2	6.204
	P-18	7	5	8.330
	P-62	8	4	8.673
	P-64	9	4	8.751
	P-67	10	5	9.726
	P-44	11	4	10.831
	P-10	12	4	12.050
	P-95	13	5	15.123
	P-28	14	13	16.049
	P-114	15	9	17.424
	P-31	16	8	18.564
	P- 2	17	7	21.037
	P-69	18	8	21.342
	P- 1	19	12	22.559
	P-87	20	11	25.819
	P-102	21	14	27.060
	P-78	22	10	30.343
	P-101	23	11	34.571
	P-74	24	17	48.077
	P-71	25	25	75.317
GROUP B	P-23	4	1	3.449
	P-70	5	1	4.487
	P-105	6	1	4.612
	P-40	7	2	7.493
	P-56	8	2	10.675
	P-21	9	3	10.997
	P-60	10	3	13.221
	P-45	11	4	14.300
	P-22	12	3	15.023
	P-16	13	3	15.380
	P-32	14	4	15.936
	P-112	15	4	17.358
	P-26	16	5	22.361
	P-76	17	5	23.980
	P-46	18	5	27.035
	P-82	19	6	34.813
	P-73	20	10	40.680
GROUP C	P-72	7	1	6.659
	P-100	8	1	7.178
	P-17	9	1	10.371
	P-51	10	2	11.601
	P-41	11	2	18.184
	P-43	12	2	18.568
	P- 3	13	3	18.802
	P- 4	14	2	18.931
	P-61	15	3	21.567
	P-104	16	4	22.689
	P-75	17	3	24.456
	P-59	18	4	26.220
	P-29	19	4	35.075
	P-48	20	5	35.900
	P-49	21	4	36.310
	P-77	22	7	46.088
	P-88	23	3	48.710
	P-113	24	6	56.769
	P-47	25	7	57.615
	P-14	26	6	60.851
	P-50	27	16	150.458
GROUP D	P- 7	15	1	14.421
	P-94	16	1	16.426
	P-24	17	1	20.132
	P-99	18	1	25.011
	P-42	19	1	25.325
	P-107	20	2	32.416
	P-83	21	3	33.663
	P- 5	22	3	33.934
	P-110	23	1	40.409
	P-93	24	2	61.510
	P- 8	25	3	67.385
	P-98	26	7	146.040

DIVISION II

R- 4	8	1	4.455
R- 2	9	1	6.055
R- 6	10	3	9.985
R- 9	11	2	27.756
R-13	12	2	37.967
R- 1	13	5	46.425

No September Report: Strathmore Paper Co. and P-88.

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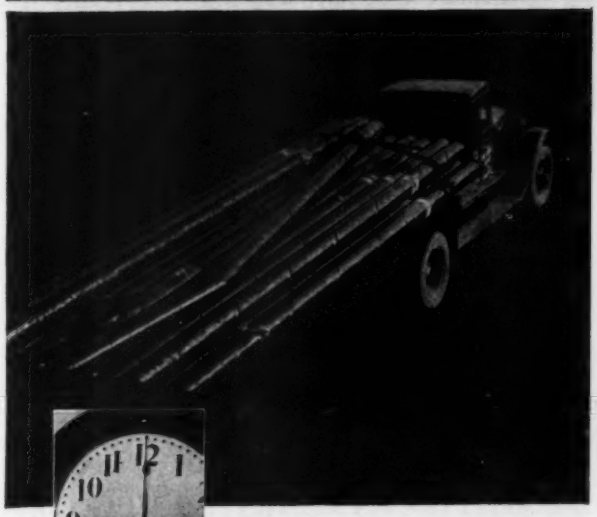

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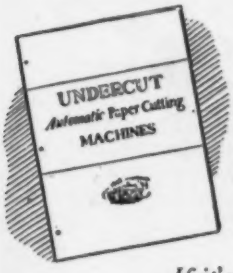

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◆ Poor Lighting Causes Accidents Every 46 Seconds

Improper use of artificial light caused an occupational accident every 46 seconds and a fatal accident every hour in America last year according to D. W. Atwater, of the Westinghouse Lamp Company, and General Secretary of the Illuminating Engineering Society.

Of the 1,269,500 occupational accidents (person gainfully employed at time of accident) recorded for the entire United States last year, 15 per cent were traceable to poor lighting, based on statistics of the National Safety Council. For such conditions to exist in 20th Century America may be regarded as neglect of available lighting facilities, since many of these accidents are preventable under even average lighting.

While carelessness can be blamed for some of these accidents, inadequate lighting is responsible for many others. Judging by the great reductions in accidents made in many industrial plants through the adoption of better lighting, it is safe to assume that a similar improvement awaits us in other industrial establishments. No matter what kind of work engages one's attention, the illumination, providing it is correctly installed and operated, can help immeasurably toward the curtailment of accidents.

Lighting can be the chief provocation of occupational accidents. If the light source is inadequate or produces blinding glare, it induces eye strain that causes a worker to misjudge and err. Workers must see well if they are to work safely.

The better light, better sight nation-wide activity in which the country's eye specialists are co-operating this year, is directed to the goal of educating everyone in the correct use of artificial light. In this manner will human eyes be aided to see better and contribute to safer working conditions.

◆ Selection of Coal for Pulverized Fuel

A number of factors govern the suitability of a coal for use in pulverized form and the order of their importance will differ whether the fuel is to be used in a cement kiln, a metallurgical furnace, or under a steam boiler. Among the factors are the sulphur content, the ash content, the softening temperature of the ash, the grindability or ease of pulverization, and the combustion characteristics. The combustion characteristics include at least two factors, the temperature of ignition and the rate of burning. The rate of burning determines the fineness to which the coal must be ground and, therefore, with the grindability determines the power required for pulverization.

Experience and research have shown some connection of the combustion characteristics to the volatile matter and other known properties of the coal, but the complete relation is not yet established. Further research by coal producers to establish this relation would enable them properly to evaluate their coals for use as pulverized fuel. *(National Coal Association Bulletin).*

◆ Eleventh National Power Show

This year's Power Show, the Eleventh National Exposition of Power and Mechanical Engineering at Grand Central Palace, December 3 to 8, will draw an attendance unprecedented in previous years, because of the unusually wide range of the machine and accessory units which will be exhibited. This prediction is now being substantiated by the number of reservations made for engineers and operating executives from all over the United States and abroad, who wish to see this review of mechanical achievement the first to be held since the depression in two years.

Research progressively carried forward while production was at a standstill has accomplished results which the average engineer has not yet had opportunity to assimilate. December at the Power Show in New York, which occurs simultaneously with the American Society of Mechanical Engineers' meeting, will reveal the latest developments in every phase of power economy and machine efficiency. From the generation of power, through its transmission, in every phase up to the final machines which manufacture the products, literally in every phase of mechanical industry, the pageant of mechanical engineering progress will be complete. Power, its transmission and use, through the mechanisms

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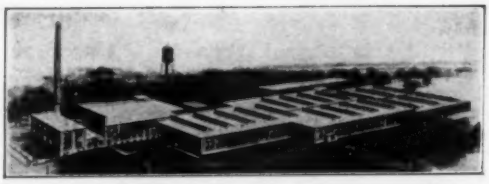

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and processes of mechanical engineering, embraces a field so broad that workers in any phase of it urgently need an exposition to show them the field as a whole. The transmission section, conveying the generated power to the fabricating machines, and the innumerable accessories, beggars description, so great is its scope.

The development of many other sections of this year's great national Exposition shows the trend of modernization in power saving costs in every field. There will be a comprehensive display of metals, materials handling equipment, fans and blowers, heating and air conditioning equipment.

◆ IMPORTERS "entering" canary and poster papers as standard newsprint may find a day of reckoning upon which they had not counted when selling these papers in the belief that their paper had been admitted as duty-free paper, according to the Import Committee of the American Paper Industry. Shipments of such papers, entered as standard newsprint, are being admitted subject to a bond to guarantee payment of a dumping duty if such a duty is levied upon standard newsprint. Pending action on the newsprint dumping case the importers are not notified that their paper may eventually be classified as dutiable paper. When dutiable paper is entered as standard newsprint no action may be taken immediately, but eventually duty will be collected. What the importers now think are profitable transactions may therefore eventually prove to be subject to heavy losses when duties are paid.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF MARCH 3, 1933

Of "The Paper Industry," published monthly at Chicago, Illinois, for October 1, 1934:

State of Illinois, County of Cook, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Edward B. Fritz, who, having been duly sworn according to law, deposes and says that he is the owner and publisher of "The Paper Industry" and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Edward B. Fritz, 333 N. Michigan Ave., Chicago, Ill.; Editor, Harry E. Weston, 333 N. Michigan Ave., Chicago, Ill.; Managing Editor, A. Scott Dowd, 333 N. Michigan Ave., Chicago, Ill.; Business Manager, Edward B. Fritz, 333 N. Michigan Ave., Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Edward B. Fritz, 333 N. Michigan Ave., Chicago, Ill.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

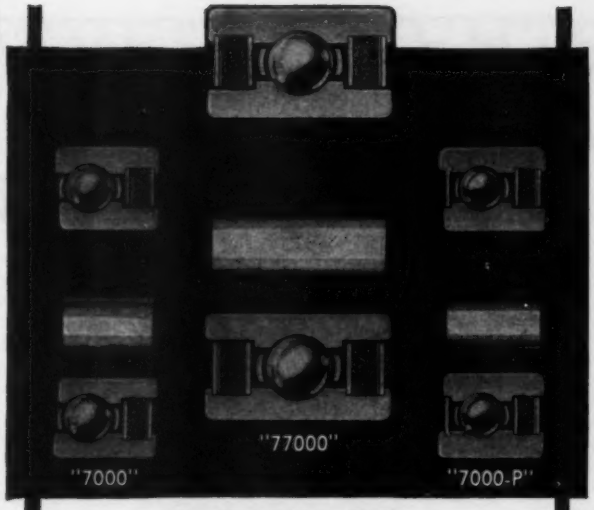
5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is ..... (This information is required from daily publications only.)

EDWARD B. FRITZ,

Sworn to and subscribed before me this 21st day of September, 1934.

[SEAL] JANE A. DeWITT.

(My commission expires August 1, 1936.)



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TECHNICAL DEVELOPMENTS

IN THE PAPER INDUSTRY

The following abstracts are of the latest developments found in the foreign press and in the patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

◆ Shaking Devices and Their Placement

The invention has for its object a shaking device or devices that may be mounted rigidly or (as is stressed in the patents) quite independently of the parts to be shaken, and which may be moved or displaced to any point along the line of the table rolls and parallel to the wire of the paper machine. This permits the best placement of the shaking arrangements, so as to insure the greatest effect on the proper felting of the fibers in any specific type of paper web. Naturally these positions will vary depending on what is being produced. The patent also allows control in changing the number of impacts while the machine is in actual operation.

FIG.1

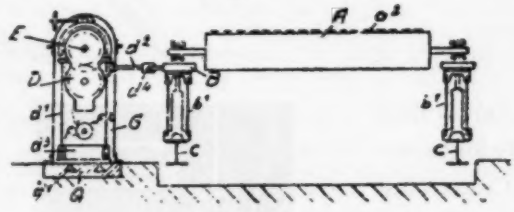


FIG.2

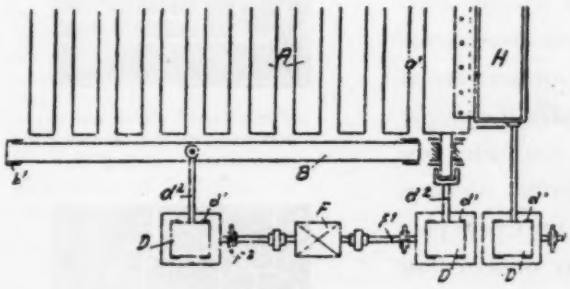
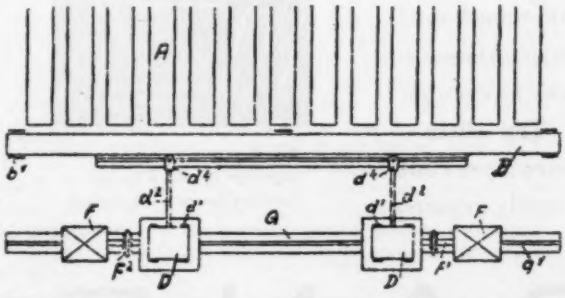


FIG.3



The tube rolls (A) turn on bars (B), elastically mounted on supports (C) by the use of suitable springs (b^1). The shaking equipment also mounted on springs transmits to (B) the necessary impulses through connecting rods (d^2). The shaking device is mounted on rails, on the foundation (Q) carrying the slide bars (g^1) along which the equipment may be moved at will. The motor (F) is mounted similarly to the shaker, either on foundation (d^3) or on the rails (Q). The impulse is given through (f^2) operated by shaft (f^1) which runs parallel to the wire and which may serve to operate simultaneously several pieces of shaking equipment. These points are illustrated in Figs. 1 and 2 [the latter also showing the relationship of shaking equipment to the headbox (H) and the breast roll (a^1)]. Fig. 3 indicates the combined shake of several totally independent devices, the oscillations of each of which may vary, although the entire arrangement may be so placed and timed that the maximum shake is given to the screen only at the points most vital to the interlacing of fibers. These patents are broad ones and include detailed sketches of driving gears, spring couplings between sections of the bar (B) whenever it is desirable to add to its elasticity by such sectioning, and variations in the form of shaking arrangement. J. M. Voith. German Patent No. 593034; French Patent No. 765,723.

◆ Acid Numbers of Pulps

The acidity refers to the acid groups that are integral parts of bleached pulps (as well as artificial silks). It does not deal with that acid which can be removed by extraction with water, nor with the sulphonic acid groups that are present in unbleached sulphite pulps. To recognize the presence of the acid groups dealt with in this paper and to measure them empirically, it is essential to free the fiber from cations that have neutralized this acidity. This was done by suspending the fibers in water for several hours, filtering by suction (using a crucible with a fritted glass filter), macerating the pulp for 0.5 hour with 0.5 per cent HCl, refiltering by suction and finally washing with 1300 cc. of distilled water. As a check on this method of treatment, a number of pulps were ashed and the chlorine content determined. This was shown to be very low, and so, at best, to account for only a fraction of the acidity indicated by the methods described below. Three different methods were used in determinations of the acid number, and while each method gave consistent, reproducible results, the figure for an individual pulp always differed in the case of the three methods, which are listed below (and throughout this abstract) as (1), (2), and (3). In (1) one gram of pulp, based on the bone-dry weight, was treated with HCl and washed in the manner described above, introduced into a flask with a ground-in glass stopper, treated with 25 cc. 0.1 normal potassium iodide solution, 25 cc. of 0.1 normal potassium iodate solution, and 0.3 cc. of neutral starch solution, and then allowed to stand in the dark for 1 hour. A titration is subsequently carried out with 0.01 normal hypo (sodium thiosulphate) solution which gives a measure of the iodine freed by the organic acid groups. Control experiments were also run in the absence of pulp. Every cc. of hypo solution is equivalent to 0.45 milligrams of COOH, or 0.01 milligrams of hydrogen ion in the pretreated pulp. Experiments with inulin, and with pulp that had not been pretreated with HCl, together with a long series of experiments in which the conditions of treatment were varied over a wide range, indicated clearly that (although the reaction is not quantitative) the results by method (1) are sharply reproducible, and do not depend on adsorption, etc. In the case of method (2) the pretreatment was identical with that preceding (1). The pulp was then removed to a wide mouth bottle and weighed to the nearest 0.1 gram. Similarly the fritted glass filter was weighed before and after the removal of the pulp cake. In this way, the absorbed water could be determined accurately. To the pulp are then added 50 cc. Normal calcium acetate solution, and the mixture is shaken from time to time during the course of half an hour. It is then filtered by suction, and the free acetic acid is determined in a filtered aliquot portion by titration with 0.01 NaOH or $Ba(OH)_2$. Naturally this is also an equilibrium reaction. The technique is best

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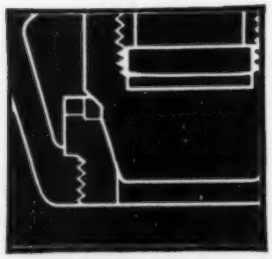
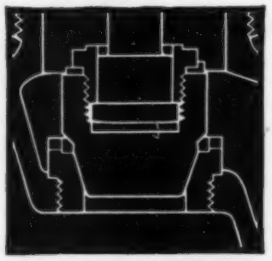


Angle and width of seating surfaces are *exactly right* to insure free operation and long life.



Plug discs and seats are ground together *in pairs* to secure tightness (permits regrinding).

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illustrated by the following examples: 0.9936 gram pulp (calculated on the dry basis) after pretreatment gave a pulp cake weighing 2.7 grams. Allowing for the additional water this made the total liquid volume after addition of Ca acetate, 51.71 cc. Of this a filtered 20 cc. aliquot consumed 1.5 cc. of 0.01 normal NaOH in the neutralization. Thus the entire 51.71 cc. would have consumed 3.88 cc. of 0.01 alkali. However, a blank experiment showed that 50 cc. of this same Ca acetate solution (free from pulp) requires 0.94 cc. of 0.01 normal HCl for neutralization of its slight alkalinity, and this figure must be added to 3.88 cc. to give the true acid number for 0.9936 grams of dry pulp; and this, calculated for exactly one gram of pulp is equivalent to 4.85 cc. of 0.01 normal NaOH, which is the acid number in this case. A thorough study of the influence of time, amount of sample used, pH of the acetate, and other factors was made. Method (2) (which is reversible and not quantitative) also gives perfectly reliable, reproducible results. Method (3) (so as to avoid the effect of water) was carried out in alcohol. It is identical with (2) except that 50 cc. of normal potassium acetate in 99 per cent ethyl alcohol were used. The highest acid numbers were always obtained by using (3). The following data have been summarized for various fibrous substances, and the so-called acid numbers in the order listed are the results obtained with (1), (2) and (3), respectively: Bleached sulphite, 3.6; 4.72; 5.37; bleached cotton, 1.01; 1.3; 3.59; commercial bleached straw pulp, 4.97; 5.22; 8.14; flax pulp, 5.39; 5.78; 7.81; pulp from Scots pine, 7.24; 7.32; 9.63. The importance of the acid numbers is briefly discussed. Max Lüdtke, Tech. Chem. Papier-u Zellstoff-Fabr. (Wochblatt Papierfabrik. Supplement) 31, No. 3, 37-42 (June, 1934).

◆ Loss of Heat in Sheet Formation

In the manufacture of newsprint, the mean heat loss coefficient (k) over the entire dry end of the paper machine ranged from 320 to 400 Calories per sq. meter, per hour, per deg. C. In slow-running machines, (k) is much lower than in high speed machines, as a result of the lower initial moisture content. Using paper stock, in which the pulp has undergone medium hydration, (k) is about 280 calories per sq. meter per hour per deg. C. With bare rolls (k) is about 52 per cent lower. (Since however no account was taken of the water absorption by dryer felts, this diminution in (k) is actually somewhat lower). A. D. Abramowitsch and D. M. Tljate; Zellstoff u. Papier, 14, 13 (1934) through Papier-Fabr. 32, No. 22, 262 (1934).

◆ Bleaching of Cellulose

With increasing temperatures, the chlorine consumption increases linearly. The effect of the density of stock on the bleach consumption was determined at 40 deg. C., during a bleaching period of 5 hours. In pulp suspensions, with concentrations above 2 per cent the chlorine consumption increased but the bleaching period was shortened. Using chlorine in concentrations ranging from 1 to 8 per cent, bleaching was also carried out in two stages at 40 deg. C., with an intermediate washing of the pulp. The highest percentage of the chlorine ions was left when a 5 per cent chlorine concentration was used. Very white pulps were obtained, when in the first stage of the bleach, 1, 2, and 3 per cent chlorine were used, and when in the second stage, 8, 7, and 6 per cent chlorine were added respectively. A series of graphs gives the relationship between bleach addition and consumption, and the concentrations of pulp suspensions and the temperatures. J. Nakashima and S. Oinuma. Cellulose Ind. (Japan) 9, 23 (1933); through Cellulosechem. 15, No. 6, 73-4 (1934).

◆ Acetyl and Methoxyl Content of Spruce

The authors have used a modification of the holocellulose (total polysaccharide) method described by Ritter and Kurth (Ind. Eng. Chem. 25, 1250 (1933)) removing lignin by means of chlorination followed by extraction with acetone-pyridine mixture. It took 5 to 6 such combined treatments to reach a point at which the material still contained 1 to 2 per cent lignin, which was then removed by means of calcium hypochlorite solution. In the original wood, the lignin determined by the HCl method was 27.2 per cent; the total loss in isolating holocellulose was about 29.3 per cent which is a very fair check on the other method. This holocellulose residue yielded 0.8 per cent methoxyl and 1.1 per cent acetic acid, while the original spruce showed 4.6 per cent methoxyl and about 1.8 per cent acetic acid. Interpreted in another way: about ⅛ of the methoxyl content of the spruce is definitely associated with the carbohydrate portion, while ⅜ of the total acetic acid yielding groups is also part and parcel of the the polysaccharide portion (holocellullose). This explains why, in determining lignin by means of mineral acids, the methoxyl content is considerably lower than when calculated from wood analyses. The exact technique of isolating holocellulose is given by the authors. Erik Häggluud and Olle Sandelin. Papier-Fabr. 32, No. 22, 253-5 (1934).

◆ Tight Folding Carton Packing Boxes

Using a roll of board and a roll of paper (the latter serving as lining, and being free from slits) the invention claims a process for the continuous manufacture of tight pasteboard boxes. In Figure 1, the slitter (2) fed by the cardboard roll (1) cuts the slits (3) as shown in Figure 2, and also forms the indented lines (4) (shown in that same figure) along which the cardboard is to be folded later.

Fig - 1

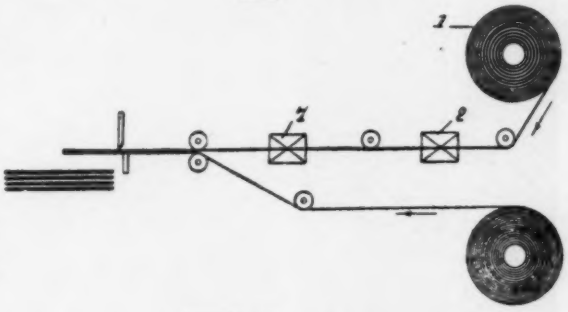
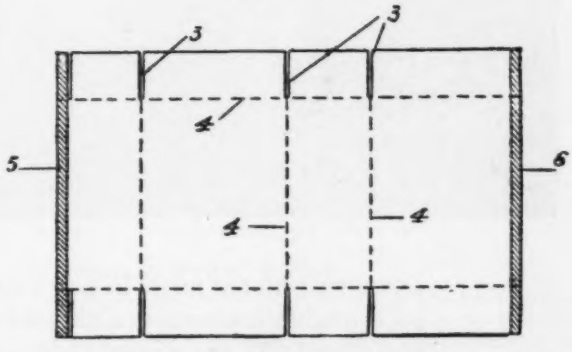


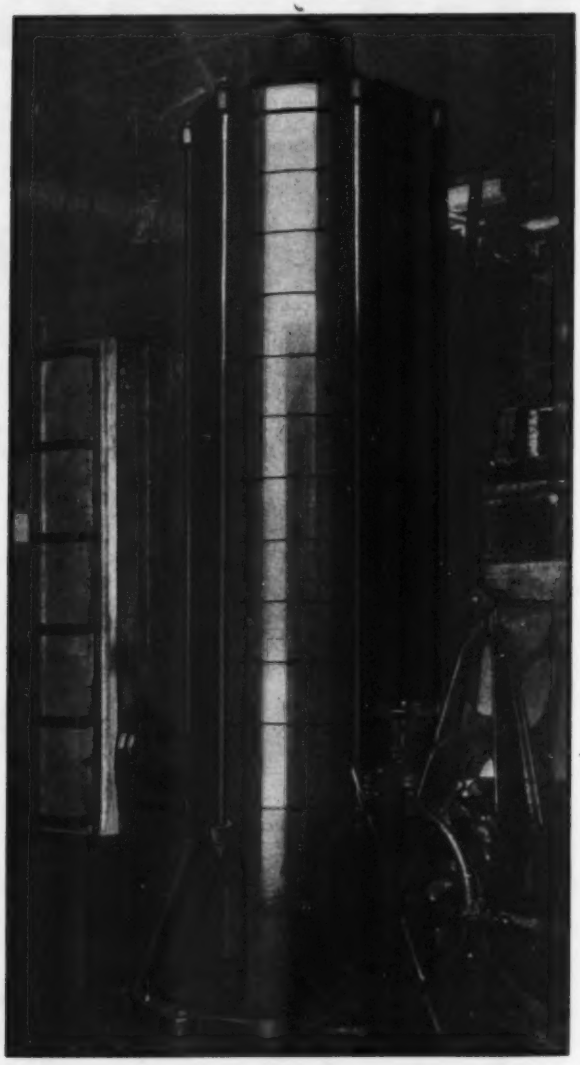
Fig - 2



The board sheet is then led to appliance (7) which continuously applies two parallel narrow strips of glue, (5) and (6) to the edges of the under surface of the board, the width of this glue insuring proper adhesion between the paper liner and the board, the two of which are then laminated together under pressure. Subsequently the product is cut into suitable lengths, as shown diagrammatically at the extreme left of Figure 1, and as illustrated by Figure 2. Societé Maunoury; French Patent No. 766,947.

◆ Removing Oil From Water

Despite the many methods now in use for the removal of oil from condensed boiler waters, the author advocates the following method which brings the oil content of the condensate down to about 1 to 2 grams per cubic meter of water and at a very low cost. The water is first sent through a coke filter that removes all but about 20 grams of oil per cubic meter, and thence into a special filter containing acti-



This machine is refining and hydrating 60 tons of bleached sulphite daily in a Wisconsin Mill.

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vated charcoal about 1 cubic meter in capacity. The latter is provided with a screen, and the water travels upwards through the filter at about 60 to 80 deg. C. The suspended as well as the colloidal oil particles are thus removed, since the activated charcoal, which is similar to that used in gas masks, has a very large adsorption surface. Freitag. Wochbl. Papierfabrik., 65, No. 22, 389-90 (1934).

◆ Temperatures on the Paper Machine

Dissatisfied with the known methods given in the literature, and pyrometer control, the authors resorted to a color scale in which certain dyestuffs change at definite temperatures. By such means it was possible to measure temperatures at difficultly accessible points of the paper machine, and also temperatures of the moving sheet. Experiments showed that the highest temperature measured (that of the drying cylinders) was 120 deg. C: the highest temperatures of the moving paper sheet ordinarily fell within the range of 50-65 deg. C. As a result of their studies, the authors feel that the paper is usually overdried, and that in consequence there is a needless loss of steam. Fijatte and Tschuwikowskij; Bumazhnaya Prom. 12, No. 11, 30 (1933); through Papier-Fabr. 2, No. 22, 290 (1934).

◆ Kama River Pulp and Paper Mill

The largest mill in Europe is now in the course of construction and should be in partial operation by the end of 1934 (According to the Moscow News however, the opening will be in 1935). It includes the installation of four paper machines, in which the width of the sheet will be about 420 centimeters. Two of these machines are being built entirely in the U. S. S. R. The installation of the dry end of one of these (made exclusively from materials manufactured in Russia) is shown in the illustration which is taken from the Moscow News of Sept. 7, 1934. The two other machines are of foreign manufacture. The average speed of production will be 230 meters per minute, and the estimated annual output is placed at 92,000 tons of newsprint. The machines are provided with individual sectional drives, and each machine has a calender stack carrying 10 rolls. In a fifth paper machine, broke and wastes will form the material for the manufacture of wrapping paper. The beater room is equipped with 20 beaters each with a content of 12 cubic meters. The pulp mill should be capable of producing 100,000 tons of pulp per annum, and a portion (bleached sulphite) will be sold. (The Moscow News however, is more conservative about production figures. The plant contains 11 sulphite digesters, each with a net volume of 280 cubic meters. Six pyrites burners each with a daily capacity of 22.5 tons are to be installed. Ten grinders with stones having 137 centimeter faces will be used. Storage space for 850,000 cubic meters of wood is provided. The author describes the progress of the installations, changes in the original plan that appear desirable, workers residences, etc. Baranow; Bumazhnaya Prom., Vol. 13, No. 2, 21 (1934) through Papier-Fabr. 32, No. 30, 11, (1934).

◆ Effect of Fiber Length on Groundwood

Screen analyses of mechanical pulp were followed by making known mixtures of different screened portions. A direct relationship seems to exist between most of the strength tests carried out on these pulp sheets, and the mean fiber length. Screen analysis seems of marked importance in evaluating the strength of mechanical pulp. The author gives full data, which include bursting strength, tear resistance, tearing length and tensile strength. E. R. Schafer and Matti Santaholma, Zellstoff u. Papier, 14, 53-5 (1934); through Papier-Fabr. 32, No. 20, 236 (1934).

◆ Pulps From Annual Plants

The Ukraine, which is lacking in forest resources, can furnish as raw materials for pulp, large amounts of straw, cornstalks, flax and buckwheat wastes, chaff residues, etc. Pulping experiments were carried out with a number of these. The straw was delignified by the sulphate and bisulphite methods, subsequently treated with acid to insure the greatest possible removal of mineral matter, and then converted into viscose. A plant known as Asclepias which also constitutes a possible Ukrainian raw material, was delignified either by the soda or bisulphite methods, and then yielded a fair grade of viscose. Pulps obtained in this way could be purified further by the Brown method. The stuff is first treated with chlorine water, then with caustic soda, and finally with bleach liquor. Pretreatment with hydrochloric acid was used in the case of cornstalks. This product was then given a soda cook, bleached and purified (by the Brown process?) and converted into viscose. Flax residues were pulped by the sulphite and sulphate methods, and then further purified. The ash figures on all pulps appear to be quite high, the most favorable ones being those obtained in the case of straw and flax pulps. Orlow. Bumazhnaya Prom., 13, Vol. 13 (1934) through Papier-Fabr. (Abstracts) 32, No. 30, 11 (1934).

◆ Determination of Bound Rosin In Pulps

Pulps that show a relatively low rosin content when submitted to the usual ether extraction may give pitch troubles nevertheless, because of rosin bound in the pulp (and escaping detection) due to the use of alkaline wash waters. The method of freeing this bound rosin, which is ordinarily in the form of a calcium salt, and of determining the true total rosin content is described. Five grams of bone dry pulp are treated with a 4 per cent solution of oxalic acid, and heated 2 minutes until the impregnation is complete. This means that the solution should be absorbed by the pulp, which is then dehydrated by allowing a stream of dry air at 60 deg. C. to pass through a glass tube containing the cellulose-oxalic mixture for about 12 hours. The sample is then extracted exhaustively in a Soxhlet apparatus with ether, the extracts and ether washings filtered through a glass crucible with fritted glass bottom, and then evaporated in a weighed 100 cc. beaker which is finally dried for 12 hours at 130 deg. C., which causes the complete sublimation of the oxalic acid without materially affecting the rosin content. In the case of a commercial pulp (originally washed with water having a pH above 7.0) the ether extract determined by the usual method was 0.66 per cent, whereas it was 1.1 per cent when determined by the oxalic acid modification. Nine other cases are cited in which the wash waters ranged from pH 7.0 to 8.6 (and the pulp samples from 7.0 to 8.0), and without exception the usual ether extract was considerably lower than the total rosin content found by the modification. The author also obtained 10 commercial samples of pulp that had been washed with water showing a pH below 7. Here in each case the ether extract and the total rosin content were practically identical. (It is quite evident from the data obtained with commercial pulps that pitch troubles are not due entirely to the so-called bound rosin, since there were a number of troublesome samples in which the total rosin content was no higher than the usual ether extract, and also no higher than that of samples that gave no difficulties whatsoever. Ernst Graap. Papier-Fabr. 32, No. 27, (Technical Section) 318-20 (1934).

◆ Boron in Wrapping Paper

The antiseptic properties of boric acid and its derivatives are well known. Here borax serves to preserve the starch and carbohydrates in wrapping paper, especially when this is to be used in warm, moist climates favorable to the rapid development of bacteria. Based on the weight of the paper about 5 per cent of borax is used, and according to the author it may be added at any desired step in the manufacturing process. Anonymous. (Originally appearing in Chimie et Industrie); through Moniteur Papeterie Francaise, 71, No. 6, 138 (Mar. 1934).

◆ Introducing Dyes Into Beater

A water-jet nozzle is introduced between the dye vat (located above the beater tub) and the distributing pipe. By means of this water-jet the color is sucked in, diluted, and the cooled solution conveyed further under pressure. The dye solution is finally led into a spray tube, which permits covering the entire surface of the stock in the beater, during the actual beating process. This avoids color differences, and insures a uniform adsorption of dye by the fiber. Willy Scheu; Mainz-Kastel. German Patent No. 592629; Kl. 55c.

★

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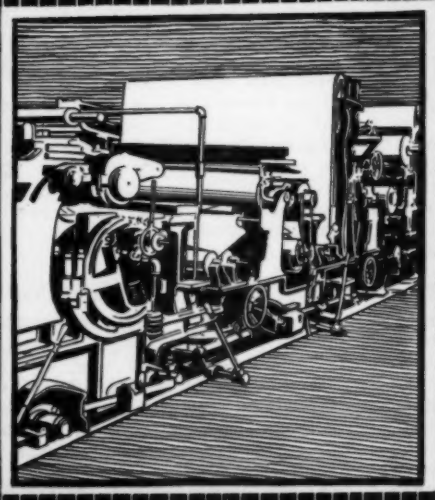

ORR FELTS

The COMMERCIAL OUTLOOK

New York, November 1, 1934.

There are indications aplenty that production activity in the paper industry is increasing, due to broadening demand and a larger movement into converting and consuming channels. Lately issued figures bear this out in a number of different directions within the industry. Probably a portion of the activity expansion is attributable to the usual seasonal improvement in paper demand and business in the fall months, yet in at least some cases there is reason to believe an actual increase in market requirements, and having nothing to do with the time of the year, has occurred.

General business has picked up appreciably in recent weeks. One of the most encouraging features in the situation is that retail trade has expanded all through the country, the gain in sales of merchandise over the counter to consumers having been greater than the increase in wholesale business. Obviously, this means that the stage is being set for larger manufacturing operations as wholesalers and jobbers, as well as retailers, seek to replenish their reduced stocks. Perhaps a specific cause of the broader demand for paper of various classes is the approaching holiday period, during which consumption of paper of some kinds reaches its zenith for the year. Sentiment within the paper industry is optimistic, the feeling being common that favorable market conditions and business of fairly extensive dimensions will be witnessed over the next couple of months.

A large increase from a year ago in retail advertising was shown in September by figures based on newspaper advertising in seventy-seven cities, according to Advertising Age. Total volume was 135,068,000 lines, a rise of 4,132,000 lines from September, 1933. Classified advertising gained more than 1,100,000 lines. Total newspaper advertising linage of New York and Brooklyn stores in September totaled 3,184,866 lines, an increase of approximately 6 per cent over the total of 2,990,451 lines in the same month last year. This gain in advertising accounts for the rise in consumption and larger production of newsprint paper.

Newsprint output in the United States and Canada climbed nearly 18,000 tons in September over the preceding month, or 7.12 per cent. Production of print paper during the first nine months of this year registered a rise of 21.89 per cent over the corresponding period a year ago.

Shipments of roofing paper from mills in August rose to the highest level in three years, totaling 3,655,547 squares of all types of prepared roofing, according to Census Bureau figures, and showing big increases over 1,616,926 squares shipped in July last and 1,802,370 squares in August a year ago. This large gain in roofing shipments is attributed to the Government's home rehabilitation program through the Home Owners Loan Administration.

Paperboard production increased some 44,000 tons during August compared with the preceding month to a total of 246,266 tons, against 201,924 tons in July, and constituting the largest month's output with a single exception in any previous month this year.

A higher price for newsprint is being given much consideration within the industry, more especially in Canada. Premier Taschereau of Quebec, with the support of Premier Hepburn of Ontario, has promised to take steps against companies selling newsprint at the 1934 level over the next year, and has declared that if necessary he would ask the Dominion Government to forbid the export of newsprint from Canada sold at the 1934 contract basis. Newsprint is being made and marketed at prices which mean a definite loss to manufacturers, it is contended by members of the industry. As proof it is cited that of the six principal producing companies in the Province of Quebec, two are operating in bankruptcy and the others are in red ink or near the border line.

Production of newsprint in the United States and Canada in September amounted to 270,289 net tons, compared with 252,323 tons in the same month last year. United States output was 74,117 tons, against 72,907 tons a year ago, a gain of 1,210 tons or 1.66 per cent, while Canadian production was 196,172 tons, against 179,416 tons a rise of 16,756 tons or 9.34 per cent, according to News Print Service Bureau figures. For the first nine months of the current year production in the two countries totaled 2,610,907 tons, an increase of 468,943 or 21.89 per cent over the 2,141,964 tons produced in the similar period of 1933. This was the greatest nine months' production since 1930, when 2,887,198 tons were manufactured. Nine months' Canadian output was 1,881,207 tons, an increase of 432,655 tons or 29.87 per cent over the 1,448,552 tons in the same time last year, while United States mills turned out 729,689 tons in the first nine months of this year, against 693,412 tons last year, a gain of 36,277 tons or 5.23 per cent. Shipments from mills in both countries during September were 4,028 tons less than production in that month, and stocks at the end of September were 85,605 tons, contrasted with 81,960 tons a month before.

Mills in the United States produced a total of 246,266 net tons of paperboard in August, compared with 201,924 tons in the preceding month and 312,747 tons in August, 1933, bringing the aggregate for the first eight months of this year up to 1,848,712 tons, against 2,048,596 tons in the corresponding period a year ago, according to the monthly compilation of the U. S. Census Bureau. Production of board in the eight months this year was at 59.2 per cent of mills' rated capacity, contrasted with 65.5 per cent last year in the same time.

New orders received by manufacturers for board in September called for 246,187 tons, compared with 200,278 tons in the month before, and unfilled orders held at the end of September were for 71,523 tons, against 73,256 tons in August. Shipments of board from mills in September aggregated 223,686 tons, contrasted with 179,264 tons in the preceding month, and stocks on hand at mills at the close of September were 69,034 tons, against 69,119 tons a month previously.

◆ ◆

◆ Pyrites in Pulp Making

The Outokompu mine, lying about 200 kilometers north of Viborg, Finland, now supplies seven plants that formerly depended solely on imported sulphur. The raw material is a powdered, flotation pyrites, containing 48 per cent sulphur, 0.2-0.3 per cent copper, .001-.002 per cent selenium, and 6-7 per cent moisture. The specific gravity is 1.5. Trial ore-roasting in modern furnaces showed a loss of only 1.1 per cent sulphur. In contradistinction to the coarser, so-called table concentrate, which is high in copper, the finer flotation product shows much less tendency to form slag. The costs in changing from ordinary sulphur burning to the use of pyrites dust have been computed. In terms of the element sulphur, the present costs are 600 Finnish marks per ton for the pyrites as compared with 1650 Finnish marks for imported sulphur. The unusual interest manifested in this type of pyrites is indicated by the fact that 3 large Finnish machine companies are manufacturing 3 special types of ore roasters. The mine at present suplies annually 43,000 tons of raw material, calculated as sulphur. J. A. Capjon; Papir-J., 21,163 and 175 (1933), through Papier-Fabr. 32, No. 4, 46 (1934).

◆ Soft Soap From Sulphate Manufacture

The soap is formed from the so-called liquid resin, a by-product of sulphate pulpmaking. The warm fluid mass is kneaded with calcined soda, water is removed, and the material is cooled and pressed. To obtain a uniform, spotless product, extreme cooling is resorted to, until the entire mass hardens. A Hellström, Kotka, Finland. Norwegian Patent No. 52,815.

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PAPER AND PULP MILL CATALOGUE

333 N. Michigan Avenue, Chicago, Illinois

Domestic RAW MATERIALS

◆ Papermaking Rags

There are some descriptions of papermaking rags in fair demand, whereas others are characterized by a distinctly quiet market condition. Aggregately, purchases by paper mills are reported of moderate volume, though smaller than normally witnessed at this time of the year. It is very apparent that paper manufacturers are confining their buying to supplies actually required; no longer is there buying ahead or for stocking up purposes; in other words, manufacturers are letting rag dealers carry the stocks while presumably possessed of confidence that when and if they need larger amounts of rags, they will find the supplies wanted readily available. This, obviously, makes for a curtailed demand as well as spotty market activity.

A factor on which rag dealers dwell considerably in their conversations with mill purchasing agents and others is the increasing export of rags for papermaking from the United States. It cannot be denied, as official U. S. Department of Commerce figures substantiate, that more rags are being shipped from this country to Europe than probably ever before. England is looking to the United States to acquire a portion of her papermaking rag requirements, as are other countries on the other side of the Atlantic, and market prices here and in Europe are such that in frequent instances papermakers abroad are buying here advantageously. As proof of dealers' claims in this connection, Department of Commerce statistics show that during the first eight months of this year papermaking rag exports from the United States amounted to 76,179,827 pounds, valued at $689,965, which actually exceeded in quantity the imports into this country amounting to 72,974,797 pounds in the same time, and showing a big gain over the exports of 30,003,027 pounds of a value of $321,728 in the corresponding 1933 period. Dealers contend that this change about in the import-export picture may lead to a scarcity of suitable rags of some grades for paper mill purposes. However, there are no visible signs at present of any danger of accessible supplies failing to fill the wants of consumers.

Paper mills are absorbing No. 1 new white shirt cuttings fairly freely, and also some other grades of new cuttings. No. 1 white shirt cuttings are quoted at 6 to 6.25 cents a pound f. o. b. shipping points, with the likelihood that purchases are being accomplished in some cases at slightly lower prices, while new fancy shirt cuttings are quoted at 2.50 cents at dealers' points, unbleached muslin cuttings at 6.50 to 6.75 cents, light silesias at 4 cents, blue overall cuttings at 3.75 cents, blue cheviots at 4 cents, light flannelettes at 4 cents, washables at 1.75 cents, black silesias at 3.25 cents, and khaki cuttings at 3.75 cents. New linen cuttings are reported selling at 10.50 cents a pound for white and 10 cents for grey, f. o. b. shipping points.

Roofing rags are finding a ready market outlet among felt paper mills. Prices are steady to firm, and dealers assert the market is well sold up. In the East, No. 1 roofing is bringing up around 1.10 cents a pound at shipping points, and No. 2 stock 80 to 85 cents per hundred pounds. Prices of foreign roofing are relatively so high that these rags are not competing with domestic material, and few shipments are coming into the country. Old white cottons are steady in demand and price at 2.50 to 3 cents a pound for No. 1 repacked, depending on quality, and are moving for export also. Thirds and blues are neglected by mill buyers and prices are uncertain at approximately 1.20 cents a pound for repacked f. o. b. shipping points.

◆ Old Paper

The high grades of old paper are selling fairly readily but a very slow market prevails for folded newspapers and mixed paper, on which fixed minimum sales prices exist under the NRA emergency order. Consuming mills in general are holding off buying the price regulated grades. Such sales as are reported in the East are at the established minima of 42½ cents per hundred pounds on folded news and 32½ cents on mixed paper f. o. b. packers' plants to mills, and slightly above these prices constitute market levels in the Middle West. A grade in excellent demand, according to reports, is No. 1 hard white envelope cuttings, which are bringing up around 2.75 cents per pound at shipping points in the East. Other shavings are moderately active, at prices of 2.10 to 2.25 cents for No. 1 hard white of ordinary quality and 1.80 to 1.90 cents for No. 1 soft white, with extra grade or one-cut soft white shavings reported worth 2.25 to 2.35 cents. No. 1 heavy book stock is selling at $12 a ton in the East f. o. b. dealers' points, No. 1 old kraft paper at $20 to $22, white blank news cuttings at $24 and $25, white ledger stock at 1.25 cents, new corrugated box cuttings at $12.50, and old corrugated boxes at $7 to $8.

◆ Pulpwood

Pulpwood demand is reported steady, and quotations are sustained. The tendency of the market appears upward, and wood in the Upper New York State district is $12.50 a cord for four-foot peeled, $14 for handshaved, and $15.50 for two-foot rossed.

◆ Mechanical Pulp

For a long time during October, the market for mechanical pulp was slow and the price trend downward. Since then the situation has firmed, due in good part to a stiffening of quotations from abroad on groundwood. Reports say that water conditions in many grinding regions in Canada are none too favorable, constituting an influential factor in the market. Prices on Scandinavian dry groundwood have firmed decidedly, also a sustaining market feature. Canadian producers are asking at least $20 per ton for prime groundwood f. o. b. grinding mills across the border, which is equivalent to $25 or $26 ex dock American Atlantic seaboard. Domestic groundwood is around $27 or $28 a ton f. o. b. pulp mills or in the vicinity of $30 to $32, or higher, delivered consuming centers.

◆ Chemical Pulp

From most accounts, domestic manufacturers of bleached sulphite are adhering firmly to the established basis of price on such wood pulp, or 2.75 cents per pound for prime grade ex dock Atlantic seaboard. There is talk of some digression, but this is not confirmed. Generally the market for domestic chemical pulp is quiet. There is a consistent movement of supplies against contracts and back orders, but current buying is admittedly of narrow compass, paper manufacturers seeming well supplied at present or for some other reason refraining from purchases except in very spotty fashion and limited tonnage. Unbleached sulphite is quoted at 2.10 to 2.20 cents a pound for ordinary prime grades, and 2.25 and 2.30 cents for extra strong qualities. Domestic bleached soda pulp remains on a price basis of 2.50 cents delivered paper mills, and domestic kraft pulp is 1.75 to 2 cents per pound f. o. b. producing points.

◆ Chemicals

Papermaking chemicals hold to generally steady quotable levels and are moving in consistent fashion though mainly against contracts. Bleaching powder is 1.90 to 2.10 cents a pound in drums f. o. b. works. Domestic casein is quoted at 10 to 11 cents per pound, depending on the grind, and imported at 14 to 14.50 cents. The quotation on soda ash in bags is 1.40 cents at works, and on caustic soda 2.60 cents for the 76 per cent solid product.

◆ Rope and Bagging

Somewhat more demand is developing for old rope, at least certain paper mills having reentered the market for supplies. Prices have registered little or no change but exhibit firmness. Domestic No. 1 old manila rope is selling at 2 cents a pound and around that basis, while importers claim they cannot handle foreign manila rope profitably at less than 2 cents per pound ex dock New York and in most cases ask in excess of this price. Bagging is quiet other than for spasmodic entrances of paper manufacturers into the market for small supplies. No. 1 scrap bagging is reported available at about 1.10 to 1.20 cents a pound at shipping points, and roofing bagging at 60 to 70 cents cwt.

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Import and Export MARKETS

IMPORTS

◆ Wood Pulp

Due to the attitude of consuming buyers, a decidedly quiet market exists for imported wood pulp. Paper manufacturers with few exceptions are engaging in little buying, other than of course when more or less urgently in need of pulp. Not in a long time, it is stated, has interest in forward shipments of pulp from primary sources abroad been quite so lacking. There are occasional inquiries, some of which materialize in sales, but generally buyers are pursuing a waiting policy, evidently being supplied for the present and apparently not caring to anticipate requirements.

Several salient reasons are advanced for the reluctant attitude of buyers. One is the uncertainty in the future paper market situation. It would appear that paper manufacturers are somewhat disconcerted concerning the outlook for their own product, and this being the case they are hesitant to enter raw material commitments, other than on a very limited scale. Another reason is the apprehension felt regarding pulp prices over the next few months, as well as probable fluctuations in foreign exchange and their effect on commodity quotations, including wood pulp. Still another is the seeming determination of a large majority of paper manufacturers to keep their assets as liquid as it is possible for them to, with the result there is not the customary readiness to purchase pulp ahead.

While the price position shows scant definite change, the situation as respects prices is not all that might be desired. Producers in Europe are, in most cases, adhering to steady quotations, more particularly on sulphite pulp, on which the production agreement among European manufacturers remains in full force. However, there are signs creeping into the open that some pulp producers on the other side of the Atlantic are eager for orders, having gone through a rather prolonged period of slow demand from United States consumers, and are at least intimating willingness to grant some concession from the price levels which have been established and maintained in the American market for a considerable time. No definite or outward breaking away from these established prices has occurred, but the market undertone is anything but firm.

Prime bleached sulphite is quoted at 2.75 cents per pound upwards, according to grade, for shipment from abroad ex dock American Atlantic seaboard. Strong prime unbleached sulphite is 2.10 to 2.20 cents ex dock for ordinary grades, and 2.25 and 2.30 cents for easy bleaching and Mitscherlich sulphites. Prime Scandinavian kraft pulp is quoted at 2.75 to 2.80 cents for the most popular mill brands. It is possible, so reports say, that purchases can be effected in some cases at slightly under these price levels. However, those on the selling side of the trade insist that these established prices are being maintained, and that producers in Europe show no disposition to digress from them.

Scandinavian groundwood has steadied following a brief period during which prices eased a bit. Consumers came actively into evidence when the market receded slightly, and meanwhile quotations have firmed to where prime dry groundwood is reported scarcely available for shipment from abroad under $23 per short ton ex dock American Atlantic seaboard, with above this quoted in some quarters.

Imports of pulp into the United States in August were below the tonnage imported in the preceding month, but the decrease was slight. Compared with the same month last year, the decline was more marked. A total of 127,557 long tons of chemical pulp, valued at $5,131,607, was imported in August, according to U. S. Department of Commerce figures, contrasted with 133,956 long tons of a declared value of $5,321,655 in July this year, and 173,787 tons of a value of $5,906,775 in August a year ago. The August receipts brought the total for the first eight months of the current year up to 916,025 long tons, compared with 867,305 tons in the corresponding time of 1933.

◆ Paper

Imports of paper and paper products into the United States during August declined 12 per cent in value compared with the preceding month, and were only 3 per cent above the corresponding month last year. Total imports were valued at $6,750,847, of which $5,954,533 represented 153,026 tons of newsprint and $796,314 other classes of paper and board, making a total for the first eight months of this year of $56,250,698, against $47,921,385 in the similar period of 1933. August imports of newsprint, which represent between 85 and 90 per cent of the total importations, dropped off nearly 15 per cent, while other classes of paper and board showed a decline of 7 per cent in aggregate value. August imports of newsprint, however, were 13 per cent in excess of the corresponding month last year, although owing to the generally lower prices prevailing this year, the value of these imports showed an increase of only 4 per cent.

◆ Paper Stock

Imports of papermaking rags into the United States declined fairly sharply during August to a total of 6,627,499 pounds, valued at $53,699, compared with 10,788,572 pounds of a value of $163,925 in the preceding month, and 29,435,573 pounds of a value of $245,629 in the same month last year. Eight months' imports this year reached a total of 72,974,797 pounds, valued at $896,526, contrasted with 102,692,069 pounds of a value of $771,181 in the similar time a year ago. Importations of miscellaneous paper stock, comprising old rope, bagging, waste paper, etc., amounted to 3,418,452 pounds of a value of $53,129 in August, making a total for the first eight months of this year of 37,582,092 pounds of a value of $558,379, against 68,495,278 pounds of a declared value of $671,271 in the same 1933 period.

EXPORTS

Exports of paper and paper products from the United States recorded a further increase in the month of August, exceeding the July exports by 17 per cent and those of the corresponding 1933 month by 57 per cent. The aggregate value of the August shipments was $1,805,776, against $1,544,864 in July this year, and $1,152,788 in August a year ago. Exportations during the first eight months of the current year reached a value of $12,239,945, contrasted with $8,955,296 in the same period of 1933.

An encouraging feature in the August increase in exports was the rise in tonnage as well as in value. Newsprint shipments recovered from the sharp decline observable in the July exports, August consignments amounting to a total of 6,190,354 pounds. Exports of book papers were about a third less than in the preceding month, but were slightly above shipments in the same month last year. Shipments of all classes of wrapping paper improved in August, greaseproof as well as ordinary wrapping papers advancing between 30 and 35 per cent. Among the heaviest increases were those recorded in the fine paper group, writings gaining by 120 per cent and tissues by 89 per cent. Exports of paperboards showed little change from the month before but boxboard shipments were 70 per cent above a year ago.

In the converted products group, shipments of toilet paper increased by 12 per cent over the preceding month, towels and napkins by 9 per cent, paper bags by 70 per cent, boxes and cartons by 28 per cent, and papeteries by 27 per cent.

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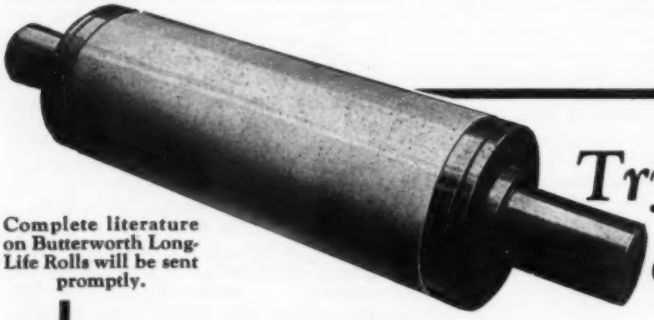

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